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The Welding Engineer

DECEMBER, 1945

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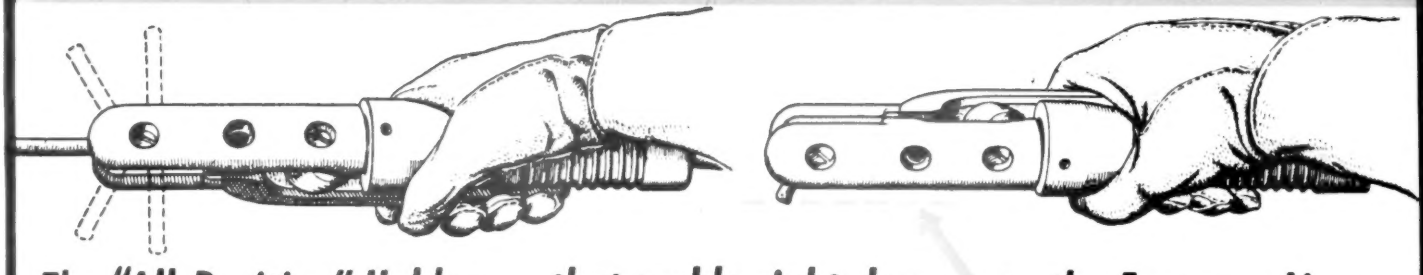

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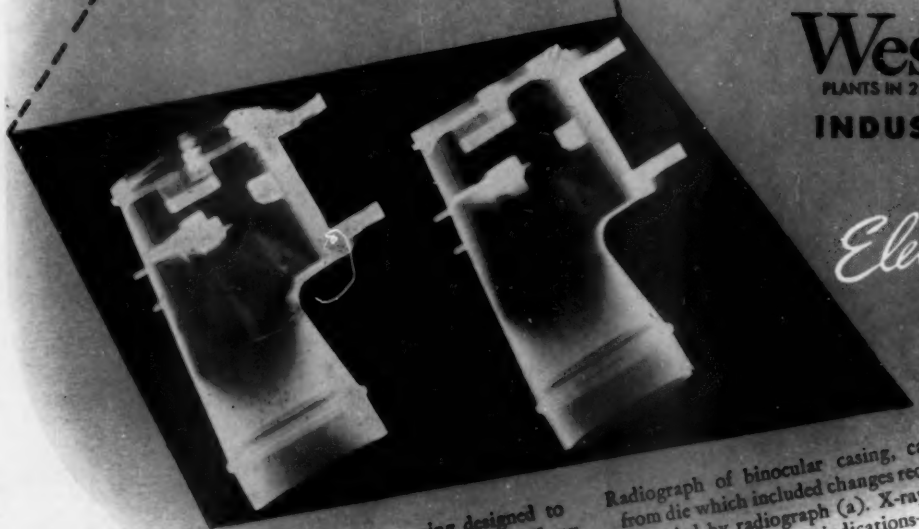

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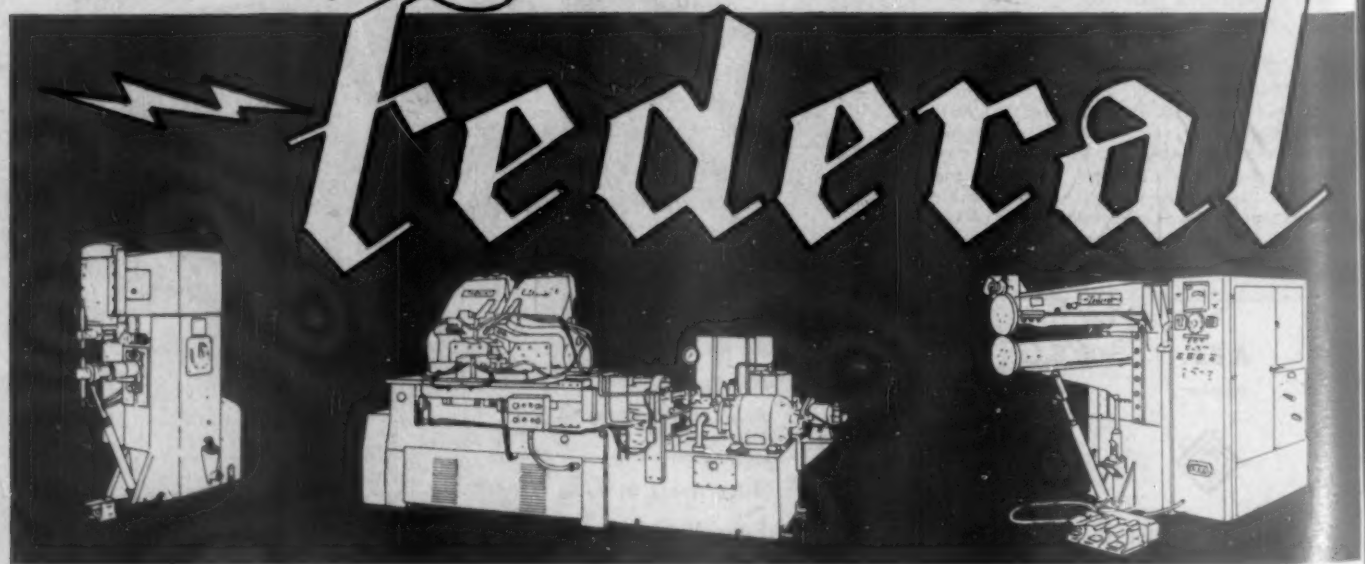


★ CONSTRUCTION

Welding in Temporary Housing

By LEONARD W. ELLIOTT
Chartered Structural Engineer and Associate Member of the Institution of Structural Engineers, London

Our British cousins seem to be miles ahead of us with plans for small prefabricated homes. Three of the seven basic types to be built in quantity during the next two years are to have frames of welded-steel construction.

WITH the war over, housing in Britain has been given the highest priority, and the long prepared plans to meet the needs of new building are being put into operation. There exist both long-term and short-term plans. The long-term plan is for four million houses in the next ten years and the short-term plan is for not less than 450,000 houses to be built or building in the next two years, with 365,000 houses completed and ready to live in. This means an average of about 500 houses a day.

At least 145,000 of this figure will be temporary prefabricated houses of the single-story, two-bedroom type, suited to newly-weds or small families. The great bulk will be factory-built.

Seven Types Planned

There are seven types of temporary houses. All are similarly planned and have the same equipment in the way of cupboard units and kitchen and bathroom fitments, but each type has a different form of construction in order to enable a maximum use to be made of the limited range of materials at present available. Each house utilizes the Ministry of Works plumbing unit, which comprises a welded mild-steel framework with all the necessary plumbing, hot water cylinder, cold water cistern and gas piping attached (Fig. 1).

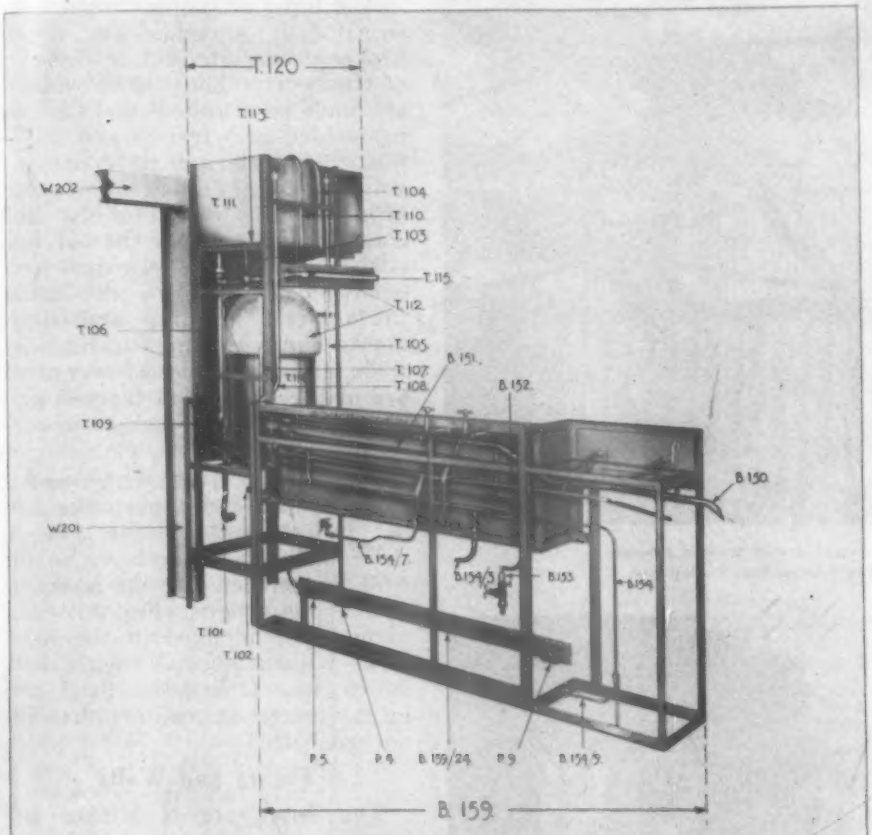
Four of the seven types are:

The Uni-Seco house which is composed of timber-framed units, covered externally and internally with asbestos-cement sheeting with an infilling of wood-wool and cement.

The Tarran house which is built up from pre-cast reinforced concrete units with an inner lining of plasterboard attached to wood inserts between the units.

The Spooner house which is virtually a timber-framed house clad externally with galvanized steel sheeting and lined internally with plasterboard, insulation being provided by means of fibreglass.

The Aluminum house. This is the only house which is subassembled into four complete units, which are coupled together on the site by means of interlocking fastenings. The construction uses a considerable amount of low-grade aluminum alloys, chiefly for external coverings and the floor framing. The house is lined internally with plasterboard and the walls



PREFABRICATED PLUMBING UNIT [KITCHEN SIDE]

T.120. ANGLE IRON TOWER UNIT.
T.101. PRIMARY RETURN CYLINDER TO BOILER.
T.102. PRIMARY FLOW FROM BOILER.
T.103. COLD WATER FEED TO CYLINDER.
T.104. VENT TO PRIMARY FLOW.
T.105. MAINS COLD WATER SUPPLY TO CISTERN.
T.106. COLD WATER DRAW-OFF.
T.107. HOT WATER DRAW-OFF.
T.108. OVERFLOW.
T.109. RETURN FROM TOWEL RAIL.
T.110. HOT WATER SUPPLY VENT.
T.111. COLD WATER CISTERN.
T.112. GLASS INSULATED MATTRESS.
T.113. CORK MATTRESS.
T.114. COPPER HOT WATER CYLINDER.
T.115. CHROMIUM PLATED TOWEL RAIL.
B.159. ANGLE IRON BASIN UNIT.
B.150. OVERFLOW.
B.151. HOT WATER DRAW-OFF.
B.152. COLD WATER DRAW-OFF.
B.153. MAINS COLD WATER SUPPLY TO CISTERN.
B.154. GAS SERVICE.
B.154/3 UNION TO GAS METER.
B.154/7 UNION TO WASH BOILER.
B.154/9 UNION TO GAS REFRIGERATOR.
B.159/5 REMOVABLE ACCESS PANEL OVER BATH.
B.159/24 METAL CHANNEL TO CARRY ELECTRIC CABLE.
W.201 WARM AIR SHROUD FOR STOVE.
W.202 WARM AIR DUCTING.
P.4. PYROTENAX CABLE, CONNECTION FOR WASH BOILER.
P.5. PYROTENAX CABLE, TERMINAL BOX FOR COOKER.
P.9. PYROTENAX CABLE, CONNECTION FOR REFRIGERATOR.

Fig. 1—Ministry of Works prefabricated plumbing unit (kitchen side)

Fig. 2—The wall sections (Arcon house) are made of rolled-steel sections jig-welded into frames and incorporating doors and windows.

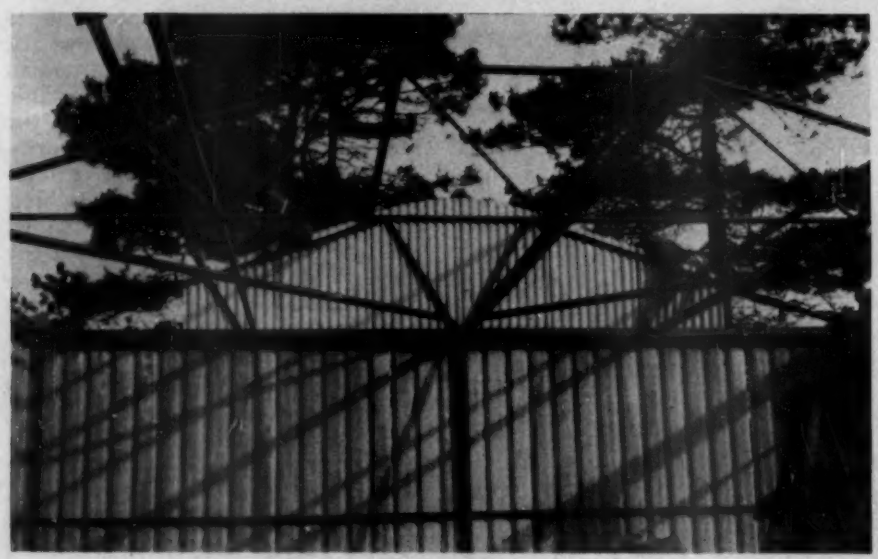


Fig. 3—The roof trusses (Arcon house) are of welded tubular-steel construction and are bolted into position on the site.

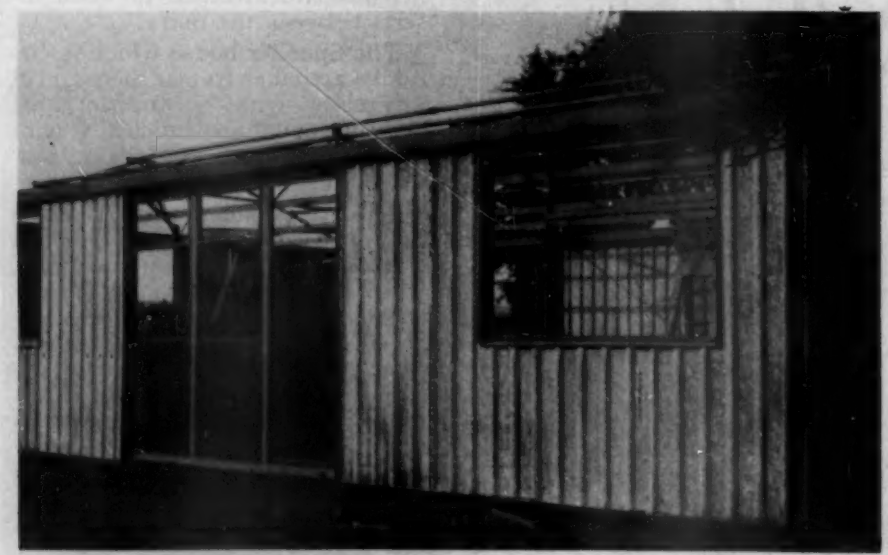


Fig. 4—The exterior (Arcon house) is clad with a double layer of moulded asbestos-cement on the walls and a single layer on the roof.

have an infilling of aerated concrete. The scientists and designers who have been responsible for Britain's air feats in this war have evolved a house which is in a class of its own in design and workmanship.

Three Welded-Steel Types

The remaining types employ welded-steel construction, and it is proposed to describe each of these in considerable detail.

The Arcon. This house plays a large part in the program and is the result of many months' research on the part of architects, Messrs. Arcon. The design represents a system of complete house construction to fulfill given requirements and is not based upon an adaptation of all-purpose units for universal application in the same way as the other types of houses are.

The basis of the system of construction is a welded-steel frame broken down into sections for ease of transport. The walled sections are made up of rolled-steel sections jig-welded into frames and incorporating steel external doors and windows (Fig. 2). The roof trusses (Fig. 3) are of welded tubular-steel construction and are bolted into position on the site. Devices have been incorporated in the frame to facilitate levelling and alignment when erecting. These include screwjacks on the lower member of the frame and tapered pins to insure correct alignment in each panel.

The exterior is clad with a double layer of moulded asbestos-cement on the walls and a single layer on the roof. The inner layer on the walls is connected to the frame by normal hook bolts (Fig. 4). The outer layer is fixed to the inner layer with a special toggle bolt, which has a Bakelite head and gives a better appearance than the normal bolt.

Floors and Walls

The floors are of timber and framed into panels which are placed into position on the site. An exposed steel tee-section insures correct placement of the internal spine partition. The walls are lined with story-height panels, 3 ft wide; each consists of ⅜ in. thick plasterboard or hardboard backed with a blanket of glass-wool and bonded on to light timber frames (Fig. 5). The thermal insulation value of the complete wall is equal to that of 11 in. cavity brick construction.

Internal partitions are in panels

Fig. 5—The walls (Arcon) are lined with full-height panels 3 ft wide. Each panel consists of plasterboard backed with a blanket of glass wool and bonded onto a light timber frame.

Fig. 6 — Cover technique (Arcon) housing the prefabricated home heating unit.

of similar dimensions; these are without insulating material and are faced on both sides with plasterboard.

The ceiling panels are suspended from the trusses by a simple system of tee-section bearers. These panels are formed with ⅜ in. plasterboard, bonded to light timber frames and backed with glasswool insulation.

One problem of a house of this nature is that the inner lining, being of timber framing, is not capable of being fabricated with the fine degree of tolerance to which the steel frame can be fabricated. To hide the gaps which inevitably occur when working in a material such as timber, the architects have evolved a series of pressed-steel sections comprising the picture-rail skirting and vertical corner cover strips. This cover technique, as it is called, also houses the electrical wiring and socket outlets (Fig. 6), and a very neat appearance is attained in the interior of the house.

The internal equipment comprises cupboard units for the bedrooms and living rooms, and also the kitchen-bathroom plumbing unit common to all the temporary houses.

The Universal House

The Universal house (Fig. 7) is the product of building contractors who have been specializing in the design and erection of prefabricated houses for some years before the war. As a result of this experience, they have designed a house which they consider a very simple one to erect on the site.

The basis of construction is a system of complete wall units which are fastened together on the site. The units are bolted down to a sole plate, and roof trusses are attached at the top. The sole plate runs around the perimeter of the concrete foundation slab; it is pressed from 16 gauge mild steel in suitable lengths and connected together on the site with cover plates. The wall-fixing cleats are spot welded on during the process of fabrication. The wall panels are built up on a 16 gauge mild-steel welded angle frame and consist of an outer lining of ⅜ in. asbestos-cement, an inner lining of plaster-

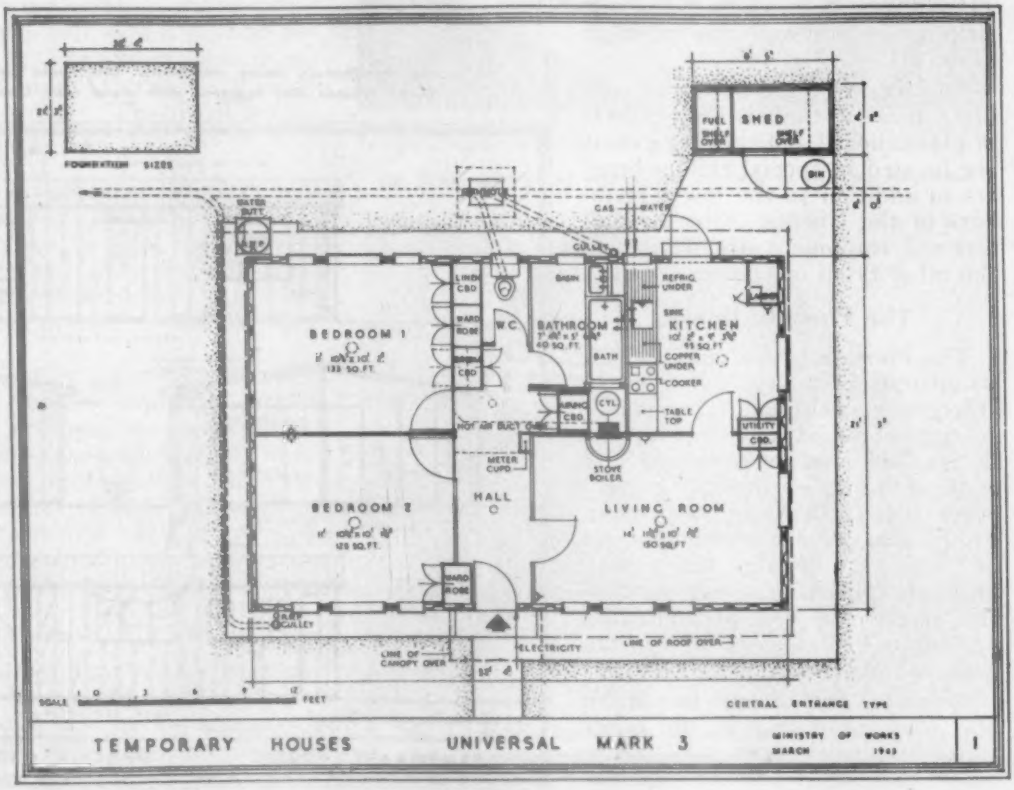


Fig. 7—Floor plan for Universal house. This type of house is made from complete wall units fastened together on the site.

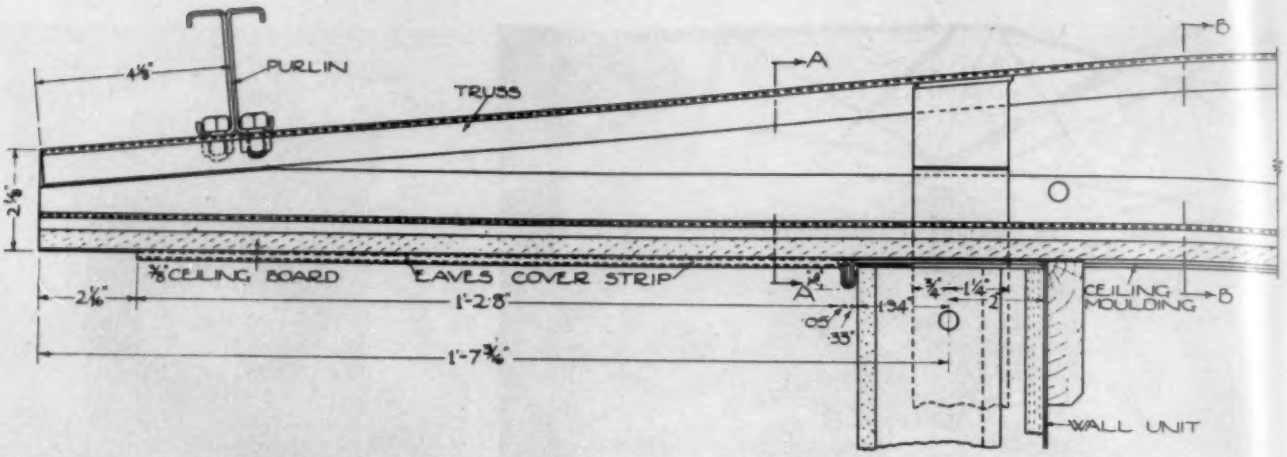


Fig. 8—Detail of roof truss (Universal house) showing general arrangement at the eaves and cover strip.

board and an internal membrane of aluminum foil or glass wool for insulation purposes. Certain wall units contain sections of metal "surrounds" for windows and the external doors. The wall panels are connected together with special fixing cleats located in slots in the frame, and a wood insert is placed between the panels to enable cover strips (of anodized aluminum on the inner side and moulded asbestos-cement on the outer side) to be screwed into position.

Roof and Ceiling

The roof trusses are constructed of a 16 gauge mild-steel web to which top and bottom flanges have been spot welded. The bottom flange is specially shaped as a fixing for the ceiling panels and has a good insert to enable a cover strip to be screwed into position (Fig. 8).

The internal partitions and ceiling panels are timber-frame panels of plasterboard. The ceiling panels are located in special ceiling bearers in addition to the lower members of the trusses. Flooring and internal equipment are similar to the other types of house.

The Phoenix House

The Phoenix house (Fig. 9) had its genesis in a proposal to erect emergency shelters for the bombed-out people of London, but the design has now been refined and evolved to the present general type. It is the work of the original group of builders, comprising some 37 firms in Britain, who coöperatively played a great part in the erection of the prefabricated harbors used so successfully in the invasion of Europe.

Actually, this house has more site work than any of the other types because it uses various external claddings adapted to the materials available and to the climatic conditions. In Scotland, for instance, where sites are more exposed, concrete blocks are used; whereas in the south or in less exposed sites asbestos-cement with glasswool insulation is adopted.

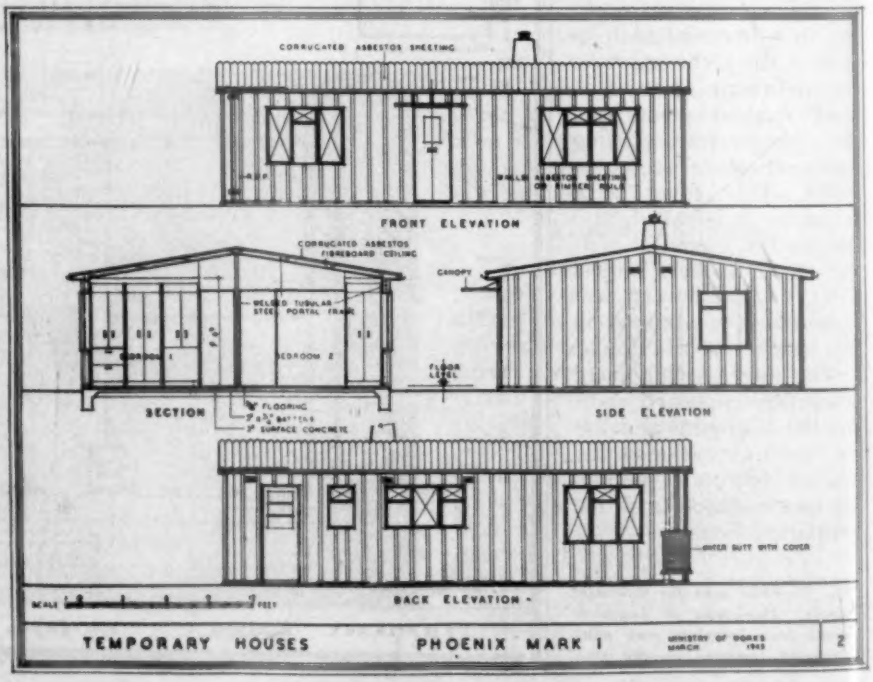
Steel-and-Wood Construction

The basis of the construction is a steel-and-wood frame composed of welded tubular-steel portal frames tied together with wood rails fixed by means of pressed-steel brackets welded into the frames. The metal windows are fixed between these rails, and the house is then clad externally. The inner lining is of hardboard and plasterboard, and the remainder of the house is similar to the other types we have described.

Conclusions

The erection of these temporary houses is now well under way in spite of the present difficult labor situation, and they are proving very popular with the tenants. The standard of equipment is much higher than that used in housing in Great Britain before the war, both as regards the quantity and quality. Prior to the war, housing was too often relegated to speculative builders, who rarely utilized the services of architects or engineers, and consequently the design and construction left much to be desired. The Government has now taken control, and official architects are empowered to see that the standard of housing is at a high level, thereby setting the pace for future developments.

Fig. 9—Phoenix house elevations. This house has welded tubular-steel portal frames tied together with wood rails fixed to welded brackets.



Fabricated Steam Platens

Flame-cutting and welding help to produce a homogeneously bonded platen with a labyrinth in its interior for steam or cooling fluid.

TEMPERATURES of high uniformity in all surface areas, elimination of hot and cold spots, efficient heat transfer . . . all of these advantages result from the use of "labyrinth" steam platens developed as a rolling mill product by Lukens Steel Co., Coatesville, Pa. These platens have a diversity of postwar applications in equipment for the processing of linoleum, plastics, chemicals, rubber, plywood, etc.

First Step: Flame-Cutting

In the fabrication of Lukens platens, three separate rolled steel plates are bonded homogeneously into one unit. The first step is to flame-cut the center plate to any desired labyrinth design, depending upon service requirements. A pattern of conventional design is shown in Fig. 1. The form of the labyrinth contributes to the smooth flow of the heating or cooling medium as there are no square corners nor dead ends to form pockets.

Next the flame-cut center plate is tack welded to a bottom plate in order to position the fingers forming the labyrinth. The third plate is then placed on top. If desired, steel of higher wear-resisting qualities may be applied as the top and bottom plates. The pack is heated to welding temperature, passed through the rolling mill and rolled hot until it becomes thoroughly bonded. After rolling, the platen may be flame-cut to size and to contour on the edges as specified. Machining is, of course, necessary to finish the outer surfaces and to cut inlet and outlet ports.

Welding Used to Form Drum

The platen thus produced may be treated as a solid plate of steel and bent or formed to shape for drums, molds, heating kettles or other applications. Fig. 3 shows how two such platens have been butt welded to form the rim of a drying or cooling drum. The heating medium enters and leaves the platen by means of the hollow supporting shaft and four hollow spokes. This drum before machining had an overall length including hub of 4 ft 7½ in., an OD of 2 ft 6 in. and a 2 ft 4 in. face.

A wide flexibility of design to suit service requirements is made possible by the method of manufacture. An interesting application is a labyrinth design in which several individual platens are gauged to single inlet and outlet ports. This type of labyrinth is particularly applicable to long platens requiring temperature uniformity over the entire surface.

Each platen is engineered to fit the conditions under which it is to be used. A standard inspection test of 1,000 psi internal hydraulic pressure has been adopted. The elimination of leaks makes the application of these platens desirable for circulating cooling media which operate at temperatures of 700 F or higher. Surface temperature variations are reduced to a minimum through the high rate of heat transfer assured by the labyrinthine form and uniform thickness of the top and bottom plates.

Thickness May Be From 1 to 25 In.

In the design of these platens, the minimum thickness is considered to be 1 in. The length, width, and maximum thickness, however, are limited only by the capacity of the Lukens 206 in. plate mill, which produces plates up to 195 in. wide or up to 25 in. thick.

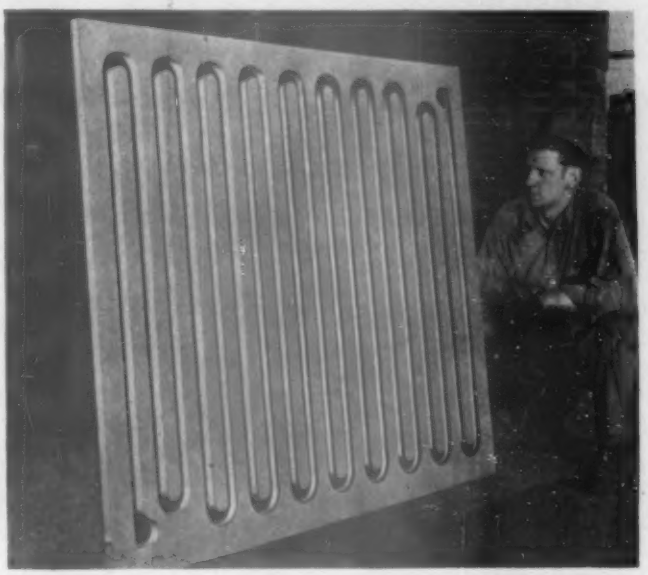


Fig. 1—Center plate of Luken steam platen with labyrinth passages flame-cut in conventional design. This plate is placed between top and bottom plates, and the three are bonded by hot rolling.

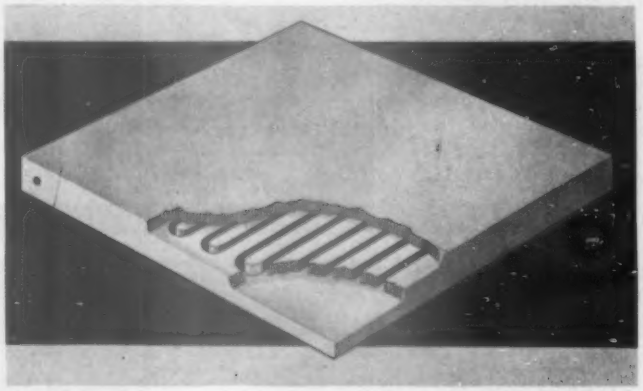


Fig. 2—A steam platen with section cut away to show the labyrinth.

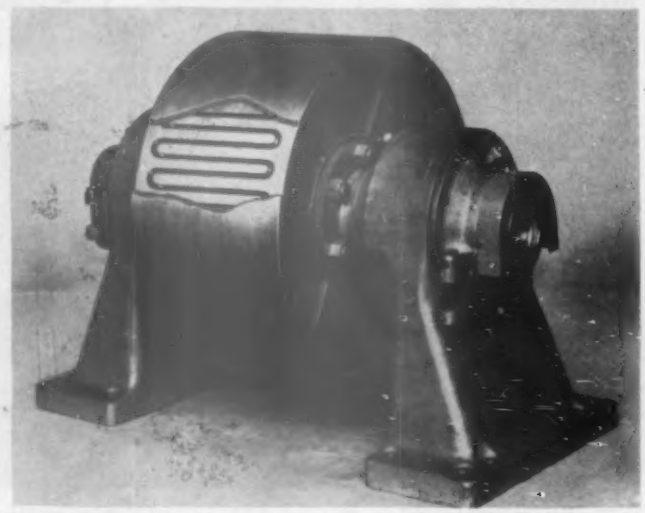


Fig. 3—Welding and bending converted two flat steam platens into a drum-type dryer. The steam enters and leaves the labyrinth by means of the hollow supporting shaft and spokes.

★ MAINTENANCE

Rebuilding High-Speed Cutters

Tool-steel welding is no longer in the experimental stage as this application proves. Worn end-milling cutters were reclaimed and new composite ones made; both lasted several times as long as the originals.

By **JOSEPH A. CUNNINGHAM** *and* **C. W. F. SUST***

A LARGE eastern manufacturer of machine tools was given the wartime job of finish-machining an oblique oval-shaped slot 3 in. wide, 9 in. long and 2 in. deep in the wall of a cast-armor tank turret. It was an exceedingly tough job. The conventional high-speed end-milling cutter was capable of completing only 10 to 12 slots before it required attention. Regrinding produced 10 to 12 more slots, after which the cutter had to be discarded.

Reclamation by Arc Welding

The high-speed milling cutter shown at the top in Fig. 1 was reclaimed by rebuilding the worn flutes with an arc-welded deposit of high-speed-steel electrodes as shown in the center unit. The miller shown at the bottom of the picture has been ground to size after welding.

The first step in rebuilding the flutes was to preheat the tool uniformly to its entire depth to approximately 850 F, using city gas and compressed air. The preheat temperatures were checked with temperature-recording crayons, using first an 800 F, then an 850 F and finally a 900 F crayon. No heat other than that developed by the arc was applied during the welding process.

The Welding Sequence

A simple jig (Fig. 2) was used to keep the flutes in an upright position during the welding process. Fig. 3 shows the welding sequence. Using a $\frac{3}{32}$ in. diameter 18-8 type stainless-steel electrode, a bead was deposited along the entire "land-side" of each flute. Stainless-steel electrodes are recommended for the first pass on high-speed milling cutters because of the physical shape of the welded surface. The flutes are long and narrow, and high-speed steel is not ductile. The stainless deposit, it was found, prevents radial checks in the flutes which might otherwise occur through insufficient preheat or insufficient peening at the right moment.

Again using a $\frac{3}{32}$ in. stainless-steel electrode, the second bead was applied on the top face of each flute.

Applying Tool Steel

The next bead was applied with $\frac{3}{32}$ in. high-speed-steel electrodes and deposited on the leading edge of each flute; *i.e.*, at the junction of the two stainless deposits. The fourth bead, using a $\frac{1}{8}$ in. high-speed electrode, was applied on the top of the second and third beads, and the fifth bead, for which a $\frac{1}{8}$ in. high-speed electrode was also used, was applied at the junction of the third and fourth beads. A study of Fig. 3 will make the procedure clear.

The welding procedure just outlined increased the "land-width" of the flute, thus adding strength and wear resistance. The nose of the cutter was rebuilt as well as the periphery of the flutes.

After welding each bead along the entire distance of one flute, the bead was peened vigorously to deform the ridges of the weld. Peening had several effects: it removed stresses, relieved any tendency toward cracking and seemed to increase hardness and toughness as well as overcoming any tendency toward porosity.

Welding Composite Cutters

A similar procedure was used for the welding of composite cutters (Fig. 4). In this case, however, it was not necessary to use a layer of stainless before applying the tool steel since the flutes of the SAE 1045 base metal are tougher and more ductile. The first pass of tool steel could be and was applied smack on the edge of each flute.

The composite cutters were made by machining a solid bar of SAE 1045 steel and applying the tool-steel deposits on the flutes by arc welding.

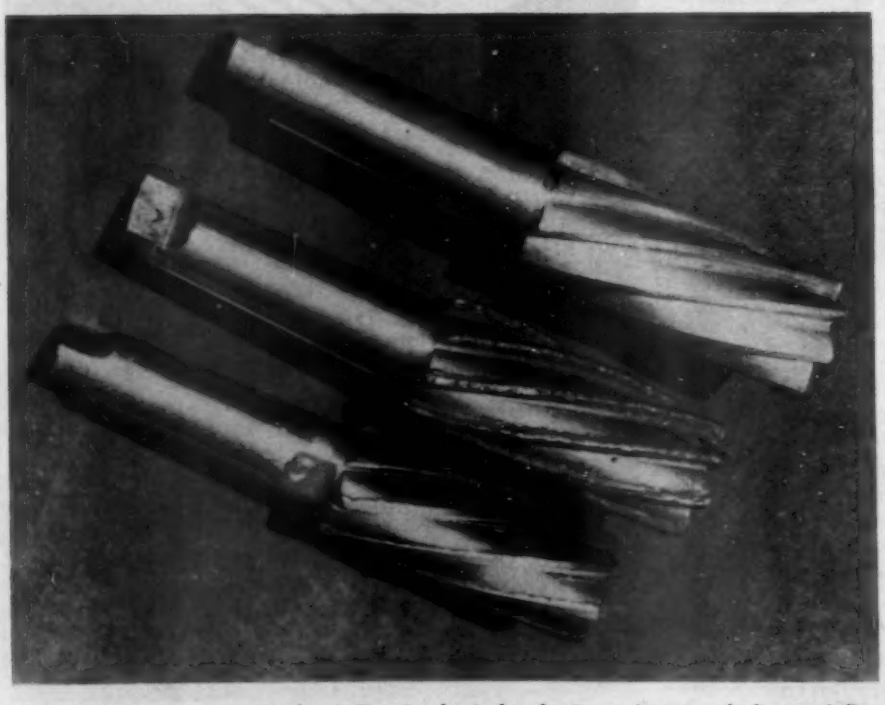


Fig. 1—Worn milling cutter (top), rebuilt cutter (center) and cutter as it appeared after regrinding.

*Mr. Cunningham is sales manager of the Arcway Equipment Co., Philadelphia, and Mr. Sust maintenance engineer of the William H. Sellers Co., Philadelphia. Technical information was supplied through the courtesy of the Alloy Rods Co., York, Pa.

Preheating was necessary as with the reclaimed high-speed cutters, but a preheat temperature of 600 F proved to be sufficient. Welding was not interrupted for any length of time once the tool had been preheated. After the welding was finished, the tool was thrust in lime for slow cooling. If it was found necessary for some reason to interrupt the welding, the tool was lime-cooled and then completely reheated before proceeding with the interrupted welding.

When rebuilding high-speed tools, the preheating should be slow, uniform and completely through to the center in order to expand the entire tool uniformly and prevent cracking, which may be due to too rapid a preheat on the surface or in one spot. SAE 1045 may be preheated somewhat faster than high-speed steel.

No postweld heat treatments were necessary for either the high-speed or the composite cutters. Tempering at 1,050 F would have increased the hardness and toughness, but it was found that essentially the same results could be secured by immersing the tool in lime to retard cooling.

Cost Comparisons

New high-speed-steel end-milling cutters use material of 18-4-2-8 analysis costing approximately $1.34 per lb. Each cutter was manufactured from a bar 2¾ in. in diameter, 12¼ in. long and weighing approximately 25 lb. The material cost was therefore $33.50. The labor involved for lathe work, milling, heat treatment, grinding, etc. totaled $30, bringing the cost of the completed high-speed-steel milling cutter to $63.

Rebuilding of one of these cutters required ½ lb of 3/32 in. stainless-steel electrodes and 1 lb of high-speed-steel electrodes. The cost of material, welding and grinding totaled approximately $17 per cutter.

Composite end-milling cutters machined from 1045 steel and welded with high-speed-steel deposits cost approximately $30 each for machining, welding and grinding. The composite cutters produced 20 to 50 cuts (as compared with 10 to 12 cuts for high-speed-steel cutters) before regrinding; as high as 70 cuts were obtained from one composite before regrinding became necessary. After regrinding, 25 to 50 more cuts could be obtained before the tool became undersized and had to be rewelded.

Composite cutters were found to be tougher than rebuilt high-speed cutters and to have no tendency to chip in either the flutes or on the cutting nose. However (if preheating and peening instructions were carefully followed), the welded high-speed cutters were entirely satisfactory, showing an average increase in life of 300% over new cutters.

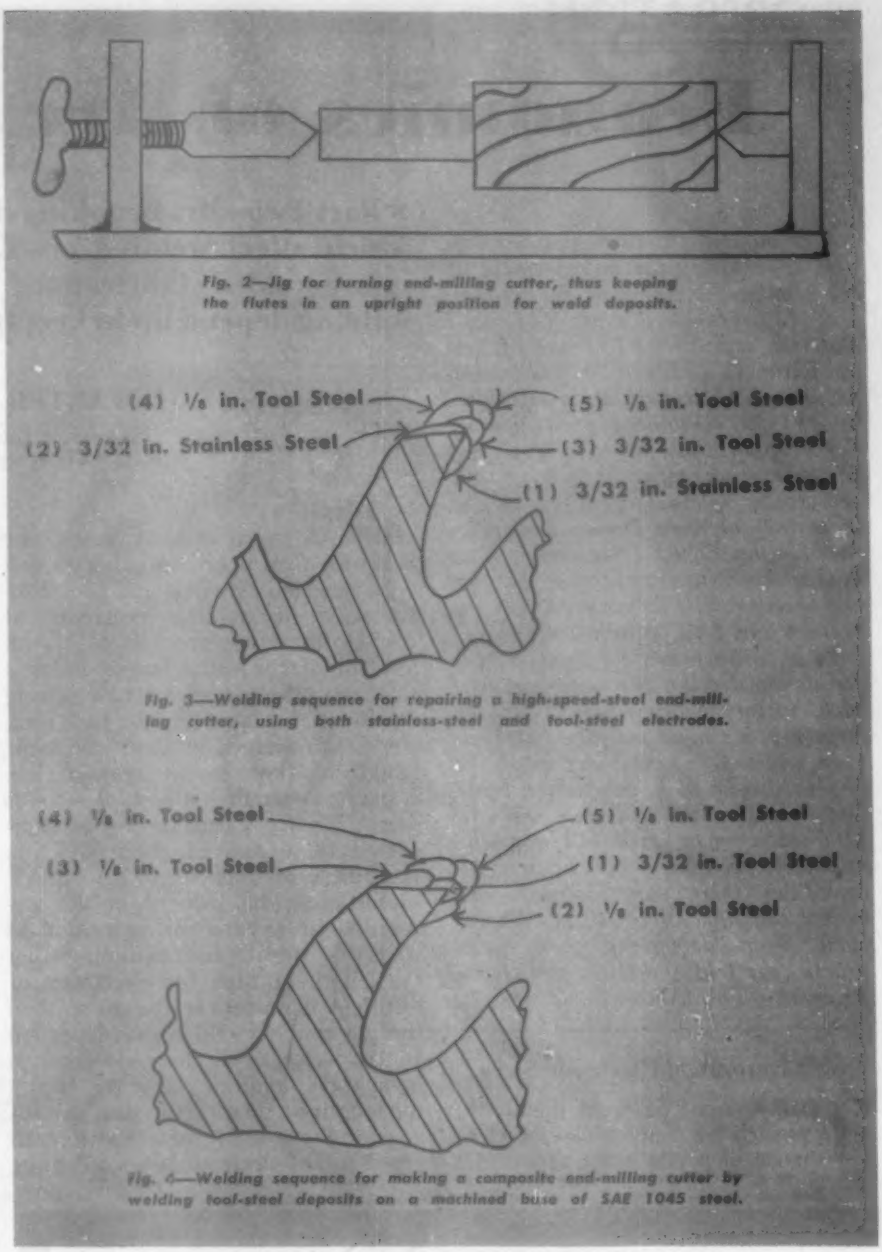

(4) ⅛ in. Tool Steel
(5) ⅛ in. Tool Steel
(2) 3/32 in. Stainless Steel
(3) 3/32 in. Tool Steel
(1) 3/32 in. Stainless Steel
(4) ⅛ in. Tool Steel
(5) ⅛ in. Tool Steel
(3) ⅛ in. Tool Steel
(1) 3/32 in. Tool Steel
(2) ⅛ in. Tool Steel

Fig. 2—Jig for turning end-milling cutter, thus keeping the flutes in an upright position for weld deposits.

Fig. 3—Welding sequence for repairing a high-speed-steel end-milling cutter, using both stainless-steel and tool-steel electrodes.

Fig. 4—Welding sequence for making a composite end-milling cutter by welding tool-steel deposits on a machined base of SAE 1045 steel.

Reasons for Longer Life

The longer life obtained from welded end millers was probably due to: (1) the increased land width of the flutes and (2) the increased amount of carbides typical of high-speed-steel weld deposits. Thirty composite end-milling cutters and twelve high-speed cutters (many of which were rebuilt by welding) were kept on hand to take care of the demand for milling the armor turrets.

This reclaiming operation is typical of the many ways progressive users of welding can cut costs of and increase the life of cutting tools. It is also a clear demonstration that the design of tools and dies may be beneficially altered by tool-steel welding.

Perhaps the greatest importance of this application is the fact that the end-milling cutters were driven into the tough armor without any attempts at babying them. Furthermore, the cutters may be considered to be one of the most difficult applications for tool-steel welding because of the slender shape of the flutes. The fact that they stood up even better than new cutters should certainly allay any fears of using welding for repairing worn dies and tools or making new dies and tools by composite fabrication.

Tool-steel welding, experimental only a few years ago, has today definitely taken its place among the many other important phases of scientific welding.

Economics of Arc Welding*

★Part Two—Mr. Brooking discusses the eight chief factors which affect welding costs. These factors are universal in arc-welded fabrication, and the cost advantages of welding depend upon keeping them under proper control.

By WALTER J. BROOKING

Director of Testing and Research,
R. G. LeTourneau, Inc., Peoria, Ill.

The eight factors offering the largest opportunity for improvement of the economic position of arc welding are: (1) proper design; (2) good material utilization; (3) use of set-up fixtures; (4) use of positioning fixtures; (5) use of large-size electrodes; (6) obtaining good fit-ups; (7) keeping down the size of welds; (8) obtaining effective use of the operator's time. The first four of these factors were discussed by Mr. Brooking in Part I (November, THE WELDING ENGINEER*), and the second four will be covered in the present and final installment.*

In order to provide a specific basis for demonstrating the importance of each factor, a hypothetical welded structure, a simple machine base, has been selected. These bases are to be produced on a mass-production basis, and it is assumed that they will cost $100 each when good but normally attainable welding practices are followed in their manufacture. The rather startling effects upon costs of even slight deviations from good practice are told in the text and charts herewith—The Editors.

5. Economical Electrode Sizes

THE amount of weld metal deposited by a given size of electrode depends more upon the volume of metal in the wire in the electrode than upon any other factor.

Stop-watch studies of the consumption of welding electrodes of diameters ranging from 1/8 to 5/16 in. and all of the same length indicate that, with the correct machine setting for the particular electrode, each electrode is consumed in about the same length of time on an average job. Usually, it requires about 90 seconds for a 14 in. electrode to be consumed to a stub of about 1½ in., regardless of diameter.

Assuming this value to be the correct length of time for deposition of electrode metal, and assuming that the length of time for electrodes of different diameters is the same, then the amount of weld metal deposited for a given size of electrode depends upon the volume of the wire. Hence the length of time required to deposit a pound of weld metal with each given size of electrode bears a definite relationship to the amount of wire deposited per electrode.

This relationship, assuming 90 seconds burn-off and 15 seconds for changing electrodes, forms the basis for the difference in cost per pound of deposited weld metal when different sizes of electrodes are used.

Volumes Vary with Cross-Sections

Fig 12 shows the relative volumes of metal in 1/8, 5/32, 3/16, 7/32, 1/4 and 5/16 in. electrodes, based on their cross-sectional areas. The volumes (and hence the respective weights of metal deposited) vary only with the cross-section since we are assuming that only 14 in. electrodes are being used. The number of electrodes per pound will therefore be in direct ratio to their cross-sectional areas, and the cost of depositing a pound of weld metal with different-sized electrodes will vary as in Fig. 13. This chart assumes a constant cost of $1.10 an hour for labor plus 150% overhead and assumes a 66⅔% deposition efficiency.

It is a common practice today to use smaller electrodes—even when larger ones could conveniently be used. Even where positioning fixtures permit the use of welding electrodes of any size suitable for a given weld, more small electrodes are used than are in keeping with good welding practice.

Assuming in the case of the machine base discussed in Part I that an 1/4 in. electrode would be the best average size, the difference in cost between that and the next smaller size, 7/32 in., is a significant figure (see Fig. 14).

The relatively insignificant difference of 1/32 in. in size in electrode diameter represents a total difference of 27% in welding cost alone or

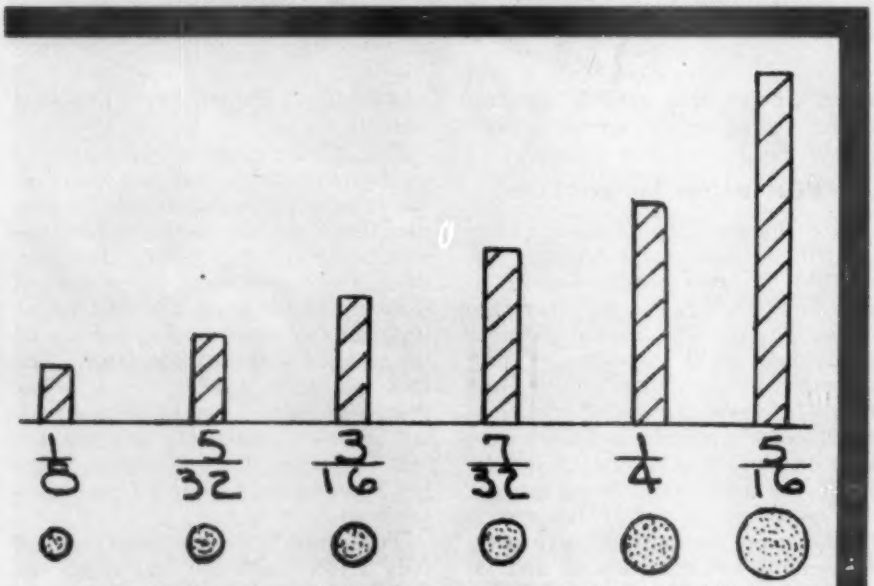


Fig. 12—Relative volumes of electrodes ranging in diameter from 1/8 to 5/16 in. inclusive. Assuming correct machine settings, all of these electrodes will be consumed in about the same time (approximately 90 seconds per 14 in. rod).

*More complete coverage of the problems given may be found in a recent book by the author, *Arc Welding Engineering and Production Control*, published by McGraw-Hill Book Co.

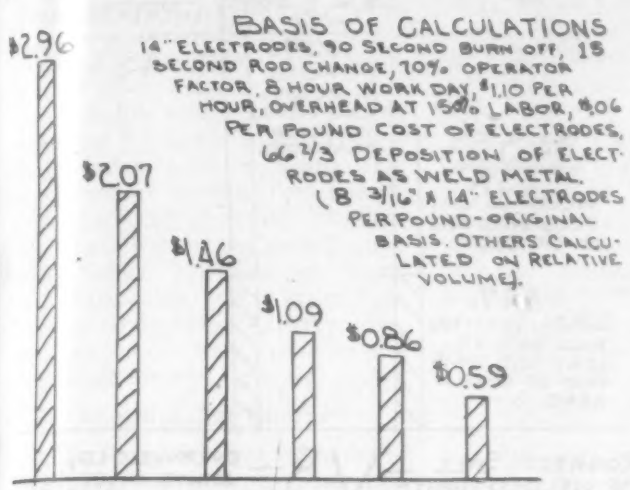

BASIS OF CALCULATIONS
14" ELECTRODES, 90 SECOND BURN OFF, 15 SECOND ROD CHANGE, 70% OPERATOR FACTOR, 8 HOUR WORK DAY, $1.10 PER HOUR, OVERHEAD AT 150% LABOR, $.06 PER POUND COST OF ELECTRODES, 66 2/3 DEPOSITION OF ELECTRODES AS WELD METAL. (8 3/16" X 14" ELECTRODES PER POUND - ORIGINAL BASIS. OTHERS CALCULATED ON RELATIVE VOLUME).
$2.96
$2.07
$1.46
$1.09
$0.86
$0.59

Fig. 13—Costs per pound of deposited weld metal using different sizes of welding electrodes.

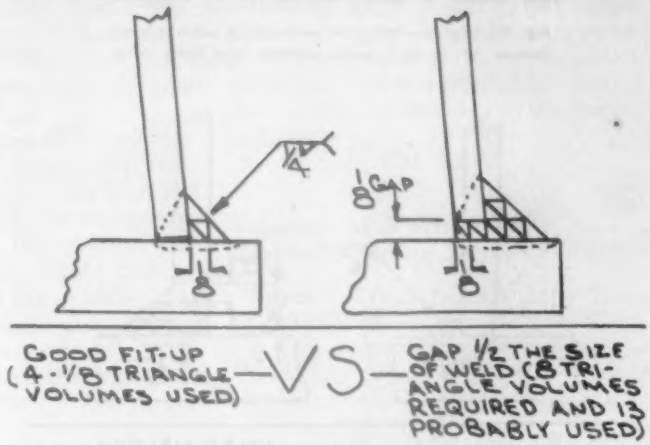

1/4
1 GAP 8
1/8
GOOD FIT-UP (4-1/8 TRIANGLE VOLUMES USED)
VS
GAP 1/2 THE SIZE OF WELD (8 TRIANGLE VOLUMES REQUIRED AND 13 PROBABLY USED)

Fig. 15—Poor fit-up greatly increases the amount of metal that must be deposited—note the details of the sketch on the right.

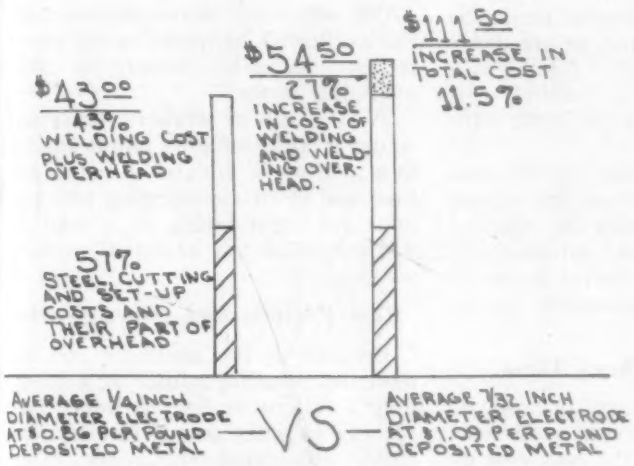

$43.00
43%
WELDING COST PLUS WELDING OVERHEAD
57%
STEEL, CUTTING AND SET-UP COSTS AND THEIR PART OF OVERHEAD
$54.50
27%
INCREASE IN COST OF WELDING AND WELDING OVERHEAD.
$111.50
INCREASE IN TOTAL COST
11.5%
AVERAGE 1/4 INCH DIAMETER ELECTRODE AT $0.86 PER POUND DEPOSITED METAL
VS
AVERAGE 7/32 INCH DIAMETER ELECTRODE AT $1.09 PER POUND DEPOSITED METAL

Fig. 14—The effects upon welding and total costs of reducing the electrode size from 1/4 to 7/32 in.

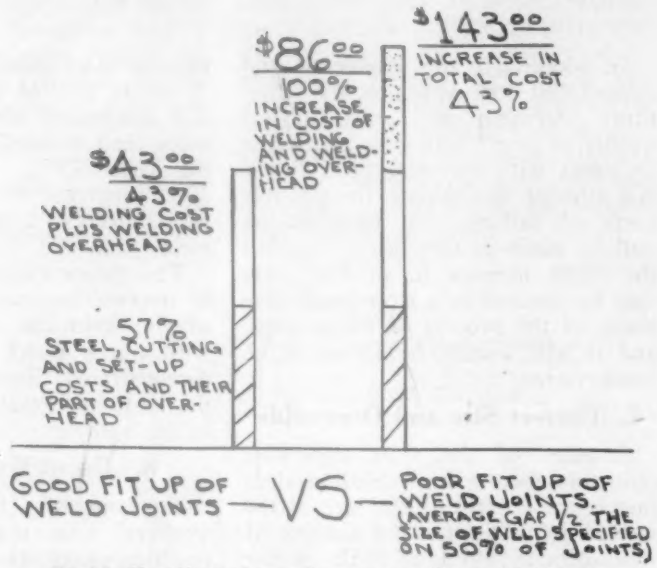

$86.00
100%
INCREASE IN COST OF WELDING AND WELDING OVERHEAD
$143.00
INCREASE IN TOTAL COST
43%
$43.00
43%
WELDING COST PLUS WELDING OVERHEAD.
57%
STEEL, CUTTING AND SET-UP COSTS AND THEIR PART OF OVERHEAD
GOOD FIT UP OF WELD JOINTS
VS
POOR FIT UP OF WELD JOINTS. (AVERAGE GAP 1/2 THE SIZE OF WELD SPECIFIED ON 50% OF JOINTS)

Fig. 16—The effects of poor fit-up upon welding and total costs. In the chart on the right, it is assumed that the fit-up at the corners and around the edges averages normally good for 50% of the joints and that the average gap in the remaining joints will not exceed one-half the size of the weld specified.

11½% difference in the total cost of the unit. If the 7/32 in. electrode is used instead of the ¼ in. electrode, the total cost of the unit is increased 11½%, which means $11.50 per unit in this case. This is a sizable margin.

6. Good and Poor Fit-ups

One of the most important of all factors in ordinary welding economics is the degree of perfection in the fitting together of the component members of the joints prior to welding. What appears to be a relatively small gap in a welded joint is often surprisingly large when analyzed by comparing its volume to the volume of the finished weld. These gaps must be filled with weld metal, and normally a welding operator will overweld a gapped joint to be sure that it will not fail rather than attempt to produce a weld equivalent in size to the joint without the unusual gap. Since deposited weld metal is an expensive commodity, costs are very quickly boosted by a considerable percentage.

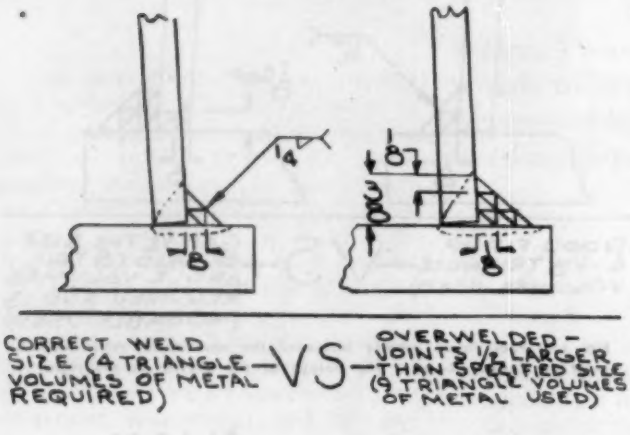
Fig 15 compares the volume of a weld without appreciable gap to the volume of the same weld made with a gap equivalent to one-half the size of the weld. The chart shows that the filled gap, plus the additional amount of metal placed by a conservative operator for safety, represents more than three times the amount of weld metal used in the joint having a minimum amount of gap.

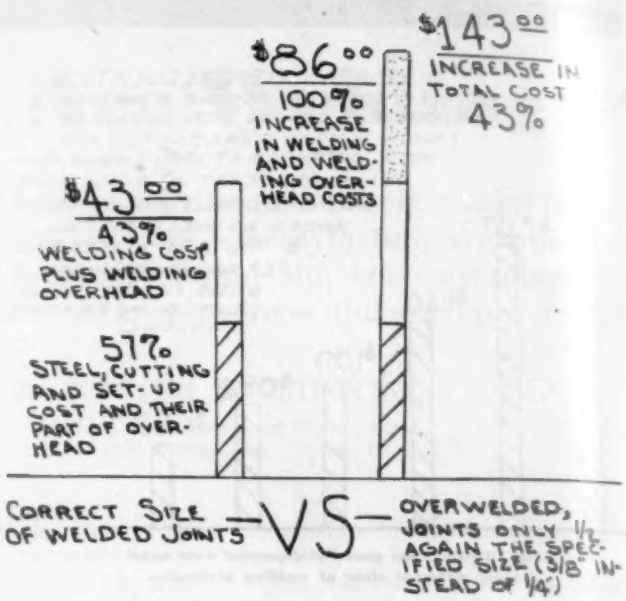
A factor of three is vastly understating the actual cost of a poorly fitted joint. It is also necessary to take into consideration that a much smaller welding electrode is required and that a much longer time is required for cleaning after each successive welding pass (and for cooling of the joint between passes) in the filling process than for a normally fitted joint. All of this greatly increases the time of deposition over a normal joint.

In the case of our machine base, assuming that normally good fit-up prevails on 50% of the joints, a gap half the thickness of the weld on the remaining 50% will increase the welding cost by 100%. This represents a 43% increase in the total cost, as is shown in Fig. 16.

Fig. 17 (below)—An increase in weld size of 50%—in this case from ¼ to ⅜ in.—more than doubles the amount of metal that has to be deposited.

Fig. 18 (right)—Effect of overwelded joints (⅜ in. instead of ¼ in.) upon welding and total costs.




$143.00
INCREASE IN TOTAL COST 43%
$86.00
100% INCREASE IN WELDING AND WELDING OVERHEAD COSTS
$43.00
43% WELDING COST PLUS WELDING OVERHEAD
57% STEEL, CUTTING AND SET-UP COST AND THEIR PART OF OVERHEAD
CORRECT SIZE OF WELDED JOINTS
VS
OVERWELDED, JOINTS ONLY ½ AGAIN THE SPECIFIED SIZE (⅜" INSTEAD OF ¼")

In addition to the volumetric and related cost considerations, the structural strength and metallurgical quality of joints with gaps is inferior to joints with normally good fit-up. No attempt to evaluate the possible costs of failures and replacements will be made in this discussion, but the 100% increase in welding costs may be checked by a stop-watch time study of the process of filling gaps, and it will usually be found to be conservative.

7. Correct Size and Overwelds

Another of the most important economic factors in welded production is the control of the size of the welded joints so that the amount of weld metal is held down to the proper size. If a fillet weld is increased in size (and therefore in strength) to double its original leg measurement and strength, there is not just twice as much weld metal deposited; *instead there is four times as much deposited.*

Overwelding is a very common practice and is very easily done, especially on structures which involve a large percentage of fillet welds. In the case of the machine base under discussion, the fact that it is a box shape where the thickness of the sidewalls is not evident (and where the capscrew or bolt blocks which are welded on the top are relatively thick) would increase the tendency for overwelding.

It is assumed in this particular case that a ¼ in. weld size would be satisfactory for all of the welds in the structure since all are box-shaped or are blocks fastened all around to a ¼ in. thick wall section by welding. For a comparison let us assume that the ¼ in. weld used in normally good practice is increased only 50% (from ¼ to ⅜ in.) as shown in Fig. 17. The amount of weld-metal needed is more than doubled and so are welding costs (Fig. 18). Again, this 100% increase in the welding cost represents a 43% increase in the completed unit.

The theoretical value for the cost of overwelding based on the volume of the weld can easily be checked with a stop watch and satisfactorily demonstrated. Size control is one of the most important economic factors in arc welding.

8. Use of Workers' Time

The operator factor or use of workers' time exerts a most far-reaching effect upon the total cost of an arc-welded unit. The percentage of time during which the arc is burning fundamentally controls the economy of the deposition of weld metal. The same is true of cutting, bending, forming, machining, setting up and other direct labor operations, and the total effectiveness of the workman's use of his time on productive work greatly influences the total cost of the finished unit.

Fundamentally, the obtaining of a high-percentage operating factor is based upon good planning, good shop layout, good organization of the tasks which must be done, good mechanical condition of fixtures, jigs, machines, etc. and good morale on the part of the workmen themselves. The workers' morale is affected by all of the other conditions named plus many other more or less intangible things which constitute the motivation of the workmen on their jobs. Sometimes an incentive system contributes tremendously to the effectiveness of the operator factor.

Fig. 19 illustrates the relative importance of a good operator factor (70% effective accomplishment by the workmen) compared to one which is less desirable; namely, a 50% operating factor.

A 70% use of workers' time may sound a little bit low, but it results in a total of 42 minutes of actual arc time and electrode-changing time per hour for eight hours, or a total of 336 minutes a day of actual work in welding.

Rest Periods and Other Work

Because of the confining and attention-demanding nature of welding, a 20% fatigue or rest allowance factor (12 minutes out of 60) is commonly considered reasonable. This results in 84 minutes of rest allowance which should be added to the 336 minutes of work. This totals exactly 7 hours, leaving only 60 minutes remaining in the day for handling time, job starting and stopping, cleaning up, changing jobs, getting electrodes and adjusting the work, such as turning fixtures, preparing to weld, etc. A 70% operator factor, then, represents a very good degree of accomplishment, although it is sometimes possible to achieve a higher operator factor under the most favorable circumstances.

A 50% operator factor, which produces only 30 minutes instead of 42 minutes of work per hour, represents a 40% increase in labor cost over the 70% operator factor. In the case of the machine base, the increase in direct labor costs causes a 24% increase in the total cost of the production of the unit. This represents $2,400 on a hundred of these machine bases as a margin for improvement in operator factor.

Since the overall operator efficiency of a shop is one of the best indications of the degree of efficiency in the organization, it is an extremely important factor. Some question might be raised about charging 150% overhead to a job with a poor operator factor, but the fact remains that if a poor operator factor is habitual in a shop, there are more workmen to do a given amount of work, which in turn requires more equipment, more payroll taxes, more factory space, more supervision and a general increase of all the costs. Actually, overhead expenses may possibly be greater for the 50% operator factor.

Accumulated Effects

In the foregoing eight examples of the specific effect of a given factor on the cost of a welded unit, only one factor at a time was considered. It is important, however, to show the cumulative effect on total cost of all of the factors concerned and to compare them to the original cost based on normally attainable good practice. This is done in Fig. 20, which shows the cumulative effect of all the various factors. These factors are added without any special interrelation of the effects on one upon the other. For example, the cost of the effect of overwelding is based on the assumption that ¼ in. electrodes were used in good practice and will also be used in the overwelding. If a smaller electrode should be used, say a 7/32 in. diameter, which makes a difference of a total of 11½% in the total cost of the unit, the cost of overwelding would be 27% greater than it actually was assumed to be. The same might be said of the cost of welding bad fits.

Even with this conservative approach, the total added cost of the unit over the cost based upon good practice amounts to $244.16, an increase of over 144%. This figure represents the difference between a cost of $10,000 for 100 machine bases and $24,416 for the same 100 machine bases.

Should we assume a 50% operator factor instead of the almost ideal 70% operator factor, the cost per base immediately goes to $322.80, an increase of 222.8% above the cost of the normally attainable good practice rated at 100%. The accumulated cost of making these bases with the less desirable practice thus exceeds 300% of the cost with normally attainable good practice in arc-welding fabrication.

These differences when accumulated may look to be very large. I believe that they are conservative. An actual careful study with stop watch and other accurate measuring devices indicates that these eight factors represent the largest common margin for economic improvement in arc welding.

There are greater advantages to be obtained by careful study, organization and control of the arc-welding process than are ordinarily realized. New applications in manufacturing seldom begin at the highest degree of obtainable good practice, yet often provide a very desirable margin of profit from the start. The margin of additional profit obtainable should prove a worthy stimulus to the manufacturer.

THE END.

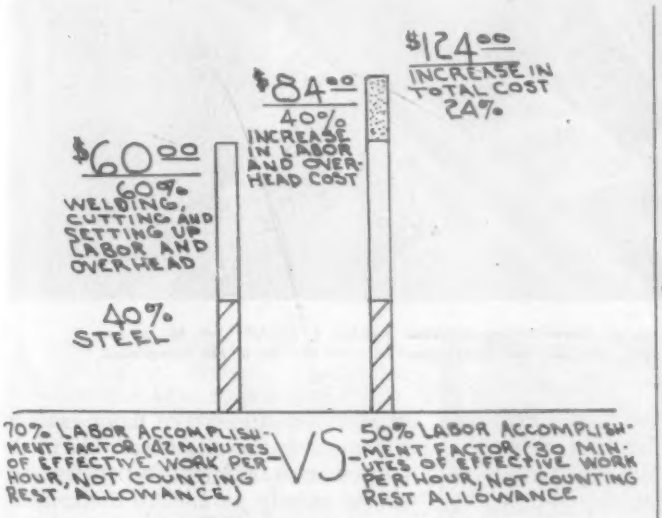

$124.00
INCREASE IN TOTAL COST 24%
$84.00
40% INCREASE IN LABOR AND OVERHEAD COST
$60.00
60% WELDING, CUTTING AND SETTING UP LABOR AND OVERHEAD
40% STEEL
70% LABOR ACCOMPLISHMENT FACTOR (42 MINUTES OF EFFECTIVE WORK PER HOUR, NOT COUNTING REST ALLOWANCE)
VS
50% LABOR ACCOMPLISHMENT FACTOR (30 MINUTES OF EFFECTIVE WORK PER HOUR, NOT COUNTING REST ALLOWANCE

Fig. 19—Costs with a 70% operator factor and with a 50% operator factor.

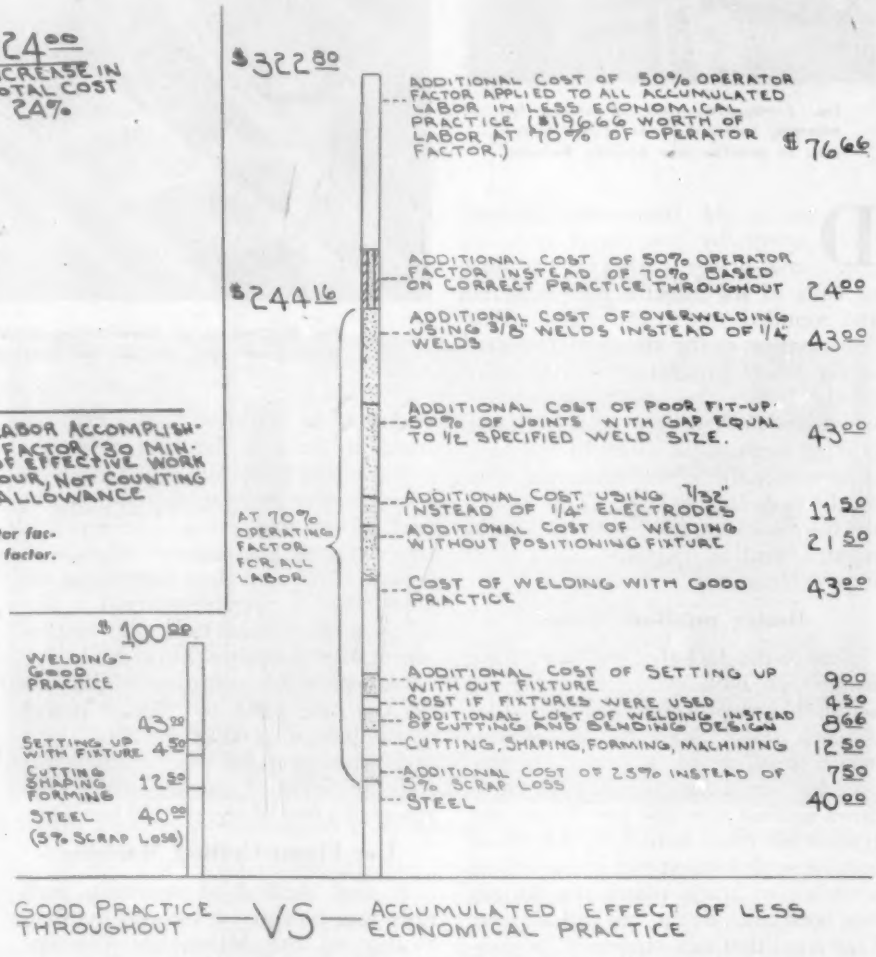

$322.80
ADDITIONAL COST OF 50% OPERATOR FACTOR APPLIED TO ALL ACCUMULATED LABOR IN LESS ECONOMICAL PRACTICE ($196.66 WORTH OF LABOR AT 70% OF OPERATOR FACTOR.) $76.66
$244.16
ADDITIONAL COST OF 50% OPERATOR FACTOR INSTEAD OF 70% BASED ON CORRECT PRACTICE THROUGHOUT 24.00
ADDITIONAL COST OF OVERWELDING USING 3/8" WELDS INSTEAD OF 1/4" WELDS 43.00
ADDITIONAL COST OF POOR FIT-UP 50% OF JOINTS WITH GAP EQUAL TO 1/2 SPECIFIED WELD SIZE. 43.00
ADDITIONAL COST USING 7/32" INSTEAD OF 1/4" ELECTRODES 11.50
ADDITIONAL COST OF WELDING WITHOUT POSITIONING FIXTURE 21.50
COST OF WELDING WITH GOOD PRACTICE 43.00
AT 70% OPERATING FACTOR FOR ALL LABOR
ADDITIONAL COST OF SETTING UP WITHOUT FIXTURE 9.00
COST IF FIXTURES WERE USED 4.50
ADDITIONAL COST OF WELDING INSTEAD OF CUTTING AND BENDING DESIGN 8.66
CUTTING, SHAPING, FORMING, MACHINING 12.50
ADDITIONAL COST OF 25% INSTEAD OF 5% SCRAP LOSS 7.50
STEEL 40.00
$100.00
WELDING—GOOD PRACTICE 43.00
SETTING UP WITH FIXTURE 4.50
CUTTING SHAPING FORMING 12.50
STEEL 40.00
(5% SCRAP LOSS)
GOOD PRACTICE THROUGHOUT
VS
ACCUMULATED EFFECT OF LESS ECONOMICAL PRACTICE

Fig. 20—Cumulative effect upon costs of all of the eight factors discussed. No attempt has been made to allow for the effects of one factor upon any of the others.

Veterans of World War II Receive Welding Training

Hobart Trade School, Inc., Troy, O., conducted by The Hobart Brothers Co., is now enrolling veterans of World War II in a specialized welding and metal-working training course. Approved by the Veterans Administration to train discharged soldiers under the G.I. Bill of Rights, the new course covers a period of 16 weeks totaling 640 hours. Individual instruction is given in: arc and oxy-acetylene welding, special alloy metals welding, carbon-arc welding, hard-facing and tool welding, metallizing, stud welding, resistance welding, submerged-melt welding and helium-shielded arc welding. Instructors are under the direction of Robert Bercaw, veteran Hobart instructor.

★ MAINTENANCE

Flame-Cutting Battered Rails

Fig. 1—General view of set-up for trimming battered edges of coal-bridge rails to provide new braking surfaces.

Worn rails on a coal-bridge runway make the bridge harder to control and represent a potential hazard to operation. A portable flame-cutting machine can be used to trim the rails flat without any grinding.

By **G. JOHNSON**
Applied Engineering Supervisor,
Air Reduction Sales Co., Milwaukee

Fig. 2—Close-up of flame-cutting machine making a straight cut to remove rolled-over edges. The slag has been removed from the cut in the foreground.

DUE to the tremendous weight borne by the travel rails on coal-bridge runways, the tops or balls of the rails become battered and rounded-over at the edges. This deformation is the result of pressure of the wheel flanges against the sides of the ball. The effect, on bridges which are braked by mechanical jaws bearing against the sides of the ball, is to reduce the effective surface area on the rails for braking. This makes the movement of the bridge harder to control, and in extreme cases it is impossible to apply the brakes.

Batter on Both Sides

Due to the fact that the wheels are flanged on both sides, the battering action likewise occurs on both sides of each rail. Since the bridge can never travel along a perfect centerline, the wheel flanges will ride sometimes against one side and sometimes against the other until both sides have become so deformed that there will be stretches of track where the flanges ride both sides of the rail ball at once. This condition can obviously be dangerous.

This rolled-over condition can be corrected by removal of the battered metal to leave a flat surface at the sides so that the brake shoes will have a larger area to bear against. In the past, efforts were made to achieve this by cutting off the battered edges with a hand torch and then smoothing the sides with a portable grinder. Another method was to mount improvised planing equipment on the bridge columns and attempt to take light cuts off the rail, using the motive power of the bridge to make the cuts. One disadvantage of the latter method was that the tie-up of the coal bridge represented a loss of about $100 per hour.

Use Flame-Cutting Machine

A new method of restoring such rails was recently developed by Paul Wittig, of the Milwaukee Western Fuel Co., and has proved very successful. The rolled-over metal is trimmed off with a motor-driven flame-cutting machine mounted on a track. The track is fitted with bumpers so that the cut will be exactly parallel to the centerline of the rail. This method produces flat surfaces in a single operation; no grinding or other finishing is required, and the cutting is done without interrupting operation of the bridge. One operator can trim both sides of 180 feet of rail per day.

Fig. 1 shows the flame-cutting machine mounted on a rail ready for cutting and also gives a general view of the coal bridge. Fig. 2 is a close-up of the operation, and the sketch (Fig. 3) shows how the standard tracks of the machine are adapted with bumpers to bear against the side of the rail ball below the battered section. This method of alignment keeps the cutting machine in line on the other side of the ball. Two lengths of track are

used, and these are provided with dovetail ends in manufacture. It is thus a simple matter to take up one track after the machine has passed on and place it in position ahead of the second track. In this way, cutting can proceed without interruption over the full length of a 30-foot rail. The torch is indexed to cut a 5-degree bevel, which is just enough to remove the battered metal without cutting off any sound metal. Gas-pressure adjustments are set at 25 psi for oxygen and 3 psi for acetylene pressure, using a cutting tip having an orifice equivalent to a No. 56 drill size (0.0465 in. diam).

Watch Temperature Differential

One precaution should be observed: the rails should not be cut with the torch during the cold weather months because the temperature differential between the chilled body of the rail and the heated face of the cut is likely to cause checking of the surface metal. The hot summer months are best, but temperature tests of cutting done on a warm day in October showed satisfactory results. Two tests were made: one in the morning and one in the afternoon. In the morning, when the outside temperature was 72 F, the rail temperature was 80 F before cutting, and after cutting it was only 186 F at the point of cut. In the afternoon, when the outside temperature was 84 F in the sun, the rail temperature was 96 before cutting and 195 F at the point of cut immediately after cutting. Neither of these temperature differentials was sufficient to cause checking.

This method of trimming produces a flat surface which gives a full bearing for the brake shoe, and it has proved entirely satisfactory in service. The method of mounting and supporting the cutting-machine tracks will depend upon whether the rail foundation is concrete or wooden ties. In the latter case, some simple means should be provided for making adjustments to the track supports in order to bring the track level at each cutting position.

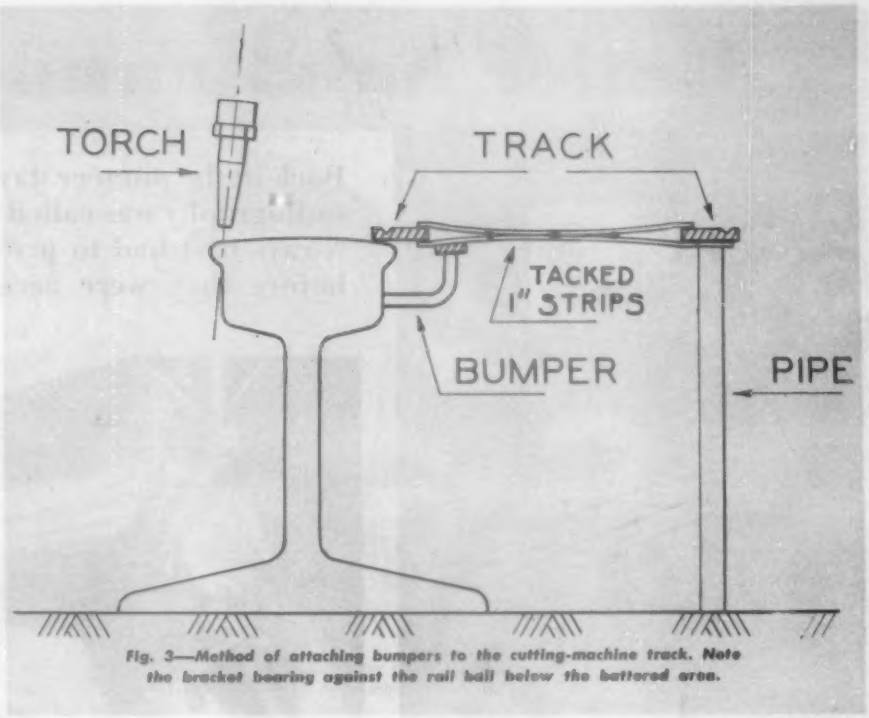


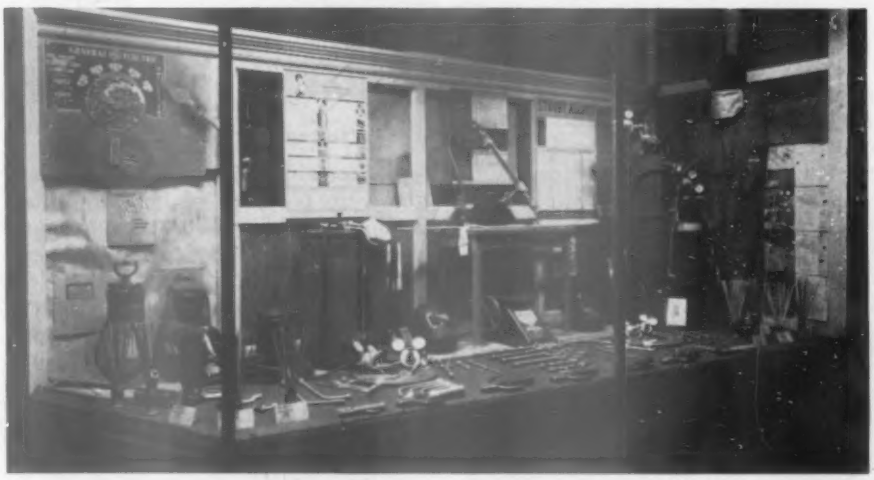
Fig. 3—Method of attaching bumpers to the cutting-machine track. Note the bracket bearing against the rail ball below the battered area.

☆ ☆ ☆

Practical Educational Program

ADEQUATE display and merchandising of welding equipment are the keys to successful jobber operation, in the opinion of Paul W. Chatterton, manager of the welding division of J. E. Haseltine & Co., Portland, Ore. This organization, with branches in Spokane and Seattle, Wash., has been distributing industrial equipment throughout the northwest for over 62 years and for the past 20 years has been a distributor of welding supplies.

A part of its merchandising activities include an educational program. The Haseltine organization has realized for some time that it is necessary to teach the weldor how to use the newer types of equipment and rods as they are developed. The educational work is carried on by one of the four specialty men in the welding division along with one or two factory representatives. Aided by a sound-motion picture projector and sound-slide or strip-film equipment, this group will travel to the smallest community (including those not normally covered by factory representatives) to show pictures of new equipment and materials and stage round-table discussions to inform the welding operator how he may get the most out of the products he uses.



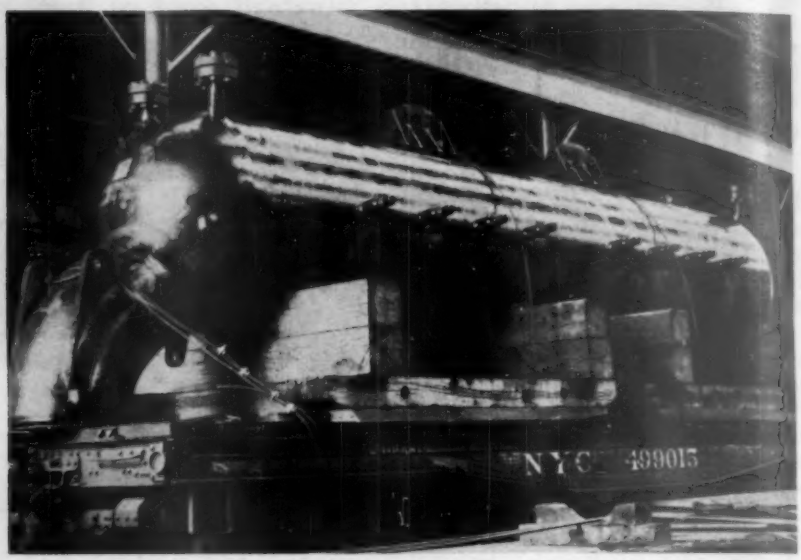
Window display of welding equipment at the Portland, Ore., headquarters of J. E. Haseltine & Co.

The value of such service is reflected in the continual demands of customers for return demonstrations and additional information.

Boiler Safety and X-rays

Back in the pioneer days of welded pressure vessels, radiography was called upon to prove weld strength. X-rays first had to prove their own worth, though, before they were accepted as reliable testimony.

One of several 200 kv X-ray machines set up to radiograph the longitudinal section of a welded drum 2 in. thick. The exposures of each section overlap those of adjoining sections.



This big power-station boiler drum operates at 2,500 psi pressure. The ends have forged "pushouts" to reduce weight and stress concentration.

As LATE as 1926 riveted vessels were not commonly used for pressures in excess of 450 psi due to the prohibitive cost and structural difficulties encountered in driving rivets of the diameters and lengths required for the heavy shell plates involved in higher pressures. The difficulty of making a rivet fill the hole properly increases greatly as the length of the rivet increases.

Pressures up to 2,500 Psi

Today there are numerous boilers that operate in the pressure range from 1,000 to 1,500 psi, and in some cases these pressures have been extended to as much as 2,500 psi. Obviously, the phenomenal fivefold pressure increase is made possible only by: (1) replacing rivets with welds and (2) X-raying the welds to prove their soundness. It seems like a simple step and an easy one, but it wasn't. It was a back-breaking, time-consuming, expensive and sometimes discouraging job of the first magnitude.

Back in 1926 not very much was known about welding techniques, but even less was known about the industrial uses of X-rays. Pressure-vessel users had had years of experience with riveted boilers and did not take kindly to a change in fabrication methods, even though it was apparent that increases in pressures were out of the question with riveted construction. Welding was looked upon skeptically; it might be a possible answer, but it had to prove its merit. Some failures in boilers with riveted construction had been recorded—with serious consequences to life and property. Too much risk was involved to warrant acceptance of a new method *except* after complete and exhaustive tests had been performed and conclusions drawn.

Pioneer Welded Boiler

Babcock and Wilcox at Barberton, O., were pioneers in believing that welding would provide the indisputable degree of safety required. Their experts began experiments with welds in 1926. For two years they worked with different compositions of welding metal and fluxes and different angles of cuts on plate. At the completion of their two-year efforts, the men carrying on their work had evolved a method that resulted in a boiler that was able to hold up under hydrostatic tests of 1½ times 450 psi working pressures for over two million charge-and-exhaust hydrostatic cycles!

That sounded like safety itself, but they didn't stop there. They conducted elaborate fatigue tests, and the results showed an endurance or fatigue limit of 30,000 psi in their welds. They set up similar tests for tensile strength and discovered that in every case the specimen was torn apart in the plate metal, never in the weld. It was only after drilling as many as five holes in the weld itself that the breakaway occurred there.

B & W were satisfied that their problem of manufacture was solved, but another problem loomed just as large—how to satisfy the customer that welded construction *was* sound construction.

X-rays Prove Weld Strength

To prove the soundness of welding, The Babcock & Wilcox Co. obtained a 200 kv X-ray machine, which was the first installation of its kind in the country. They worked out suitable techniques, and the resulting radiographs sold customers on the fact that there wasn't any difference between the soundness of weld metal and plate metal. As a result of this pioneer work—and because of the conclusive demonstrations that radiographic testing was a sound and reliable non-destructive testing method—the ASME, Navy, Coast Guard and Maritime Commission accepted welding as a construction method.

Big Jobs from Iron Horses

Fig. 1—This is what happened to a locomotive cylinder when a side rod broke. The rod tore out the head and a portion of the cylinder wall—a big, bad job to be repaired by welding.

Fig. 2—Here a steel form has been made to hold the ports open, and a piece of bushing has been fitted in the broken section.

Fig. 3—The furnace has been built, and C. J. Detamore is starting to weld the preheated cylinder. The photo was taken by Detamore's partner, Fred Meyers.

Nothing is small about a locomotive cylinder, and when it breaks it's as difficult to put back together as Humpty-Dumpty was. Meyers and Detamore, however, make a specialty of welding broken locomotive cylinders.

By **T. B. JEFFERSON**

A JOB welding shop can repair practically anything that comes along. Some shops, however, get a reputation for doing some jobs especially well and as a consequence become specialists in a particular welding application. To this class belongs the team of Meyers and Detamore, Columbus, O., who have become specialists in the welding of locomotive cylinders because of the excellent work they do.

125 Cylinders in Two Years

Very few days go by but what you will find Fred Meyers or C. J. Detamore either welding or supervising a job of welding locomotive cylinders in one of the many railroad shops in Columbus. In fact since September, 1943, over 125 locomotive cylinders have been welded by this pair, and they have yet to meet a dissatisfied customer.

A typical job can best be illustrated by the accompanying series of pictures. Fig. 1 shows the result of what happens when a locomotive side rod breaks. The piston and rod knocked out the head of the cylinder, taking a part of the cylinder with them on this mighty iron horse. The wall thicknesses of this part of a locomotive cylinder varies from 1½ in. on the side to 3½ in. on the top. This includes about 1 in. of reinforcement on the top side only.

The first steps in rebuilding a locomotive cylinder so damaged were to form steel ports of 3/16 in. mild-steel sheet and to build up a part of the cylinder wall from a section of ⅜ in. mild-steel plate. The ports were held open by making a steel form of the 3/16 in. material after tacking a piece of a bushing taken from a scrap cylinder in place. The bushing was then welded in its proper position.

On this particular job, about 8 hours were spent in preparing the cylinder for welding (Fig. 2) and in building a furnace (Fig. 3).

Theoretically, at least, the furnace was not difficult to build: it was just a matter of stacking fire bricks around the cylinder in such a manner as to avoid drafts and keep as much heat as possible within the confined area. Preheating was done with a natural-gas flame.

Welding Rods 4 Ft Long

Now everything was set for the welding job. Quarter-inch cast-iron rods 24 in. long were tacked together endwise to make them double length, and then two double lengths of rod were tacked together sidewise so that in reality a cast-iron filler rod ½ by ¼ in. by 4 ft long was used. To melt this giant filler rod, a torch with an orifice 0.1285 in. in diameter was employed. Welding was begun . . . 30 hours later, after 250 lb of welding rod, 9 cylinders of oxygen and 10 cylinders of acetylene had been consumed, the job looked as we now see it in Fig. 4. In this picture, the welding has been completed and a boring bar is set up to rebore the cylinder so that the locomotive may be put back in service.

Fig. 4—The weld has been completed, and the cylinder is now ready to be rebored.

★ PRODUCTION

"Electro-Forged" Ship Gratings

"Electro-forging" is done on a spot-welding machine, but with dies instead of electrodes so it certainly isn't spot welding. No matter how you classify it, however, it's an ingenious and very useful process.

By **ARTHUR J. RANDOLPH**
Navy Yard, Mare Island, Calif.

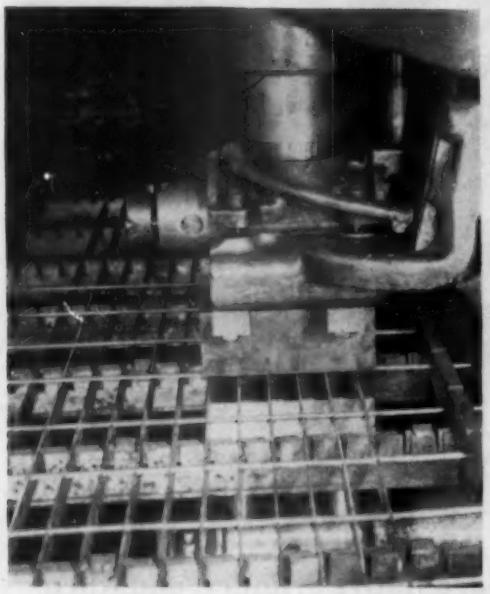


Fig. 1 (left)—Close-up of electro-forging operation by which round rods were pressed and welded into the edges of flat brass bars to form gratings. An ordinary spot welder with special dies is used for this work.

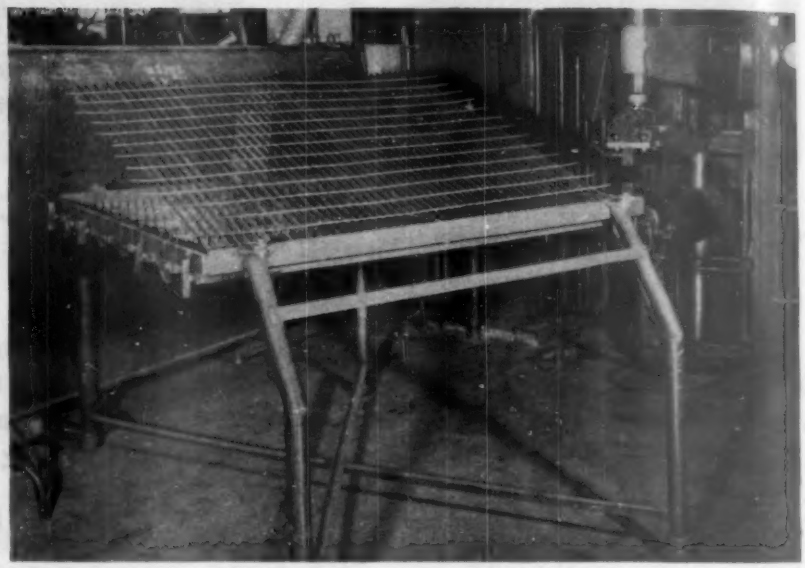


Fig. 2—Method of mounting the jig so that it would stand the heavy pressures involved. The steel deck had to be grounded and the jig insulated from the legs because of arc welding in the immediate vicinity.

STEEL grating is used in many places aboard warships: around 20 mm gun mounts, in engine and fire rooms, under submarine periscopes, for ladder treads, etc. Formerly, its manufacture at Mare Island navy yard was accomplished by piece-by-piece arc-welded fabrication. I devised dies, fixtures and other equipment and found machine settings that would permit its manufacture on a spot-welding machine. The idea was submitted to the U. S. Navy Suggestion Program for adoption at other yards. The weight and spacing of the grating components are variable over a wide range so that correct gratings for every purpose can be obtained by this method.

Dies Used for Forging

Basically, the grating consists of parallel flat brass bars, placed on edge and equally spaced, and round rods serving as the cross-tying members. The rods are pressure welded or "electro-forged" into the top edges of the bars. The forging is done on a conventional spot welder of suitable capacity, using dies instead of the customary electrodes. A close-up of the operation is shown in Fig. 1.

The dies should be of sufficient length to cover the number of welds that the machine is able to handle at each operation. They should be made of a copper alloy having a high degree of conductivity and a high annealing point and should also be efficiently water cooled.

The method of obtaining proper machine settings is illustrated by the following example:

A flat bar ⅛ by 1 in. and a round rod of ¼ in. diameter require about 4,500 amp and 600 lb pressure per weld and about 3 seconds heat time. If the dies are made to cover five flat bars, there will be five welds at each machine operation. Consequently, the machine should be set at about 22,000 amp, 3,000 lb pressure and about 3 seconds heat time.

Rods Pressed into Bars

If the machine has been correctly set, the rod will be pressed into the bar just before the heat cuts off. The pressure setting is particularly critical. Too much pressure will force the rod into the bar before the temperature of the two pieces has been raised to the welding point. Too low a pressure, on the other hand, fails to keep forging the rod into the flat bar as the heating progresses, and there will be a drip of metal that is too hot from some of the welds. The rod should be pressed flush with the top edge of the bar as shown in Fig. 1. At each junction point, the excess metal squeezes out to form a small saddle, thus creating welds of comparatively large cross-sectional area.

The unwelded section of the rod must be free to bend from its sunken position up to the edge of the next flat bar as the dies are forging the rod into place. The bend straightens out as the grating is moved to the next welding position, and another section of rod is forged into union with the bar. The front of the dies should not protrude more than 3/16 in. past the last weld so that the rod will not have to bend up too sharply; this has a tendency to put a slight joggle in it.

To facilitate the handling of large sections of grating, up to 5 feet

square, the jig was mounted on legs with ball transfers at the bottoms (Fig. 2). A deck made of 5/8 in. scrap steel was fitted over the concrete floor; this steel deck was grounded because of arc welding in the vicinity, and the jig was insulated from the legs by using 1/8 in. Bakelite washers and fiber tubing obtained from burned-out 100 amp fuses. Any danger of arc-welding feedback through the spot welding machine was thus eliminated.

Interrupted weld timing must be used for this work, alternating long heat periods with short cool periods. This has almost the same effect as a continuous heat period.

Needless to say, the edges of the flat bar and the surface of the round rod must both be clean. If at just one point there is no electrical contact, the flat bar will not heat. Consequently, it will support all of the pressure at this point, causing the other welds to overheat and burn because there cannot be any forging action to take up the softening metal.

Months of use at Mare Island have demonstrated the value of this method of grating fabrication, which has effected material savings over purchased gratings, saved arc-welding electrodes and reduced labor to about 20% of the old method. It was estimated that the Navy would save $10,000 annually through the adoption of this suggestion for its other yards.

Large Tank Shipped "Special Delivery"

Two flat cars, special routing and a special crew were needed to deliver this 140-ton welded fractionator tower to the refinery.

By **R. H. NEWTON**
District Welding Engineer, Minneapolis, The Lincoln Electric Co.

This 140-ton, 11-ft diam fractionator tower is receiving its finishing welds before special shipment from Minneapolis to Ponca City, Okla.

A WELDED fractionator tower weighing 140 tons, the largest pressure vessel ever built in the northwest, required special flat cars and the services of a specially trained railroad crew to secure its safe delivery to an Oklahoma refinery.

This huge structure measures 135 ft in length and has a diameter of 11 ft. It was shipped on two 4-truck flat cars and given special routing from the fabricating plant of William Bros. Boiler & Mfg. Co., Minneapolis, to Ponca City, Okla.

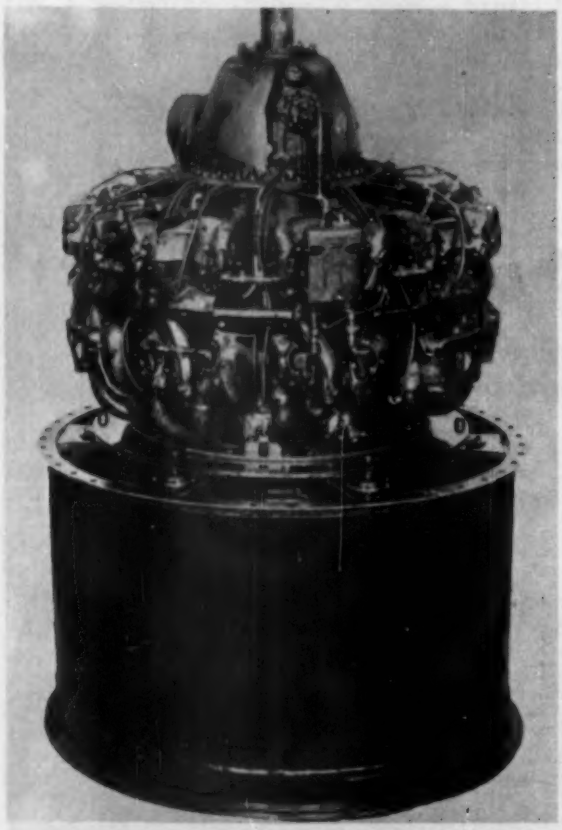
Previous experience in the handling of large vessels of this kind had revealed that expert handling was necessary to prevent the tank from being thrown off the cars due to lack of experience. On S-curves, for example, it was found that special tension on the car trucks would result in raising the center trucks of the cars as high as a foot above the tracks. Thus special routing and right-of-way was provided for delivery of this tower to its destination.

The vessel was fabricated by the latest arc-welding methods. The tank, which has a shell thickness of 1 in. and a 1 9/16 in. thick formed head, was built to API-ASME code specifications for unfired pressure vessels and has a designed pressure of 150 psi. The plates were prepared for double-U joints, and weld beads were applied both inside and out. Electrodes used were AWS E-6010 (all-position) and E-6020 (downhand).

Construction of this giant fractionator tower is another indication of the general trend to arc-welded fabrication for all types of refinery equipment.

Motors "Canned" for Shipment

Aircraft engines used to be shipped in wooden crates but no longer. Those our occupation forces receive will come shock-mounted in tall steel cylinders, fabricated by welding at Warren City Manufacturing.



CANNED aircraft engines are being shipped to the planes which will be used in the occupation of Japan and the Pacific. The "cans," air-tight steel containers to protect the motors from excessive moisture and damage in handling, are fabricated by welding at the Warren City Mfg. Co., Warren, O., subsidiary of Graham-Paige Motors Corp. One of these welded cylinders is 8 ft tall by 5 ft in diameter. The radial aircraft engine seats on a ring of shock-absorbing rubber as shown in Fig. 1.

The plane motor is secured to shock mounts on brackets in the lower section of the container, and the top and bottom sections are bolted together (Fig. 2). Then air to a pressure of 8 psi is pumped in through a valve which can be checked for leakage with an ordinary tire gauge. Prior to shipment of each completed container, the Warren plant tests the welded can by pumping in 20 psi of air.

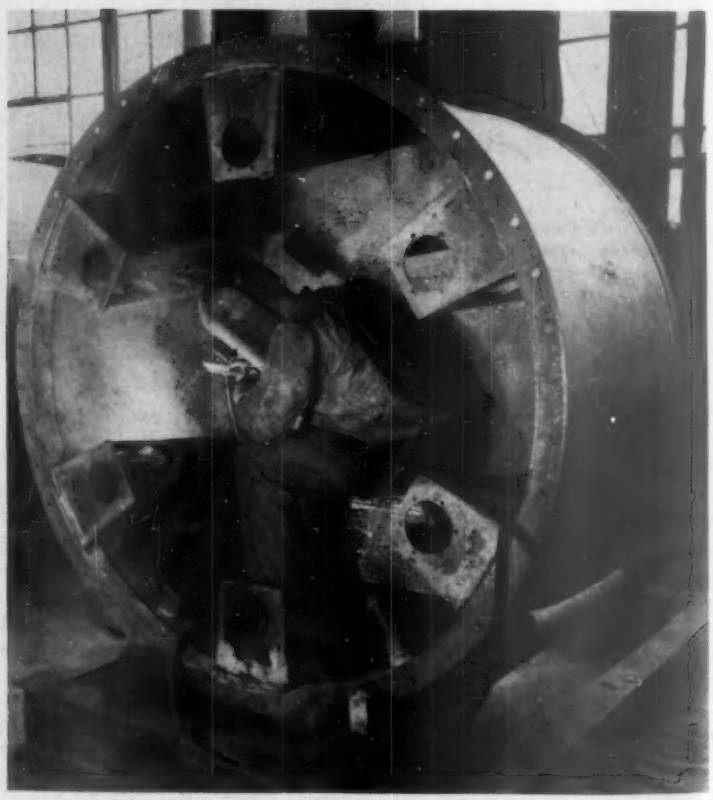
Each of the six interior brackets which holds the motor must be attached by arc welding, Fig. 3. This job is none too easy as the weldor must work within the cylinder. The latter is positioned by rollers (see picture) so that all welding can be done in the downhand position.

Designed by the Bureau of Aeronautics, the new containers are a vast improvement over wooden crates in that they require less shipping space, will stand rough treatment and eliminate the need for complete engine overhauling on arrival.

Fig. 1 (left, top)—Seated on a ring of shock-absorbing rubber, this radial aircraft engine is ready for the top section of a new-type shipping and storage container to protect it from moisture and damage in shipment.

Fig. 2—The top section is lowered over the motor (not in place in this picture), and the flanges are bolted securely together. An air pressure of 8 psi is then pumped into the container.

Fig. 3 (below)—The six interior brackets holding the motor mount must be attached by welding. Note the rolls to position the cylinder.



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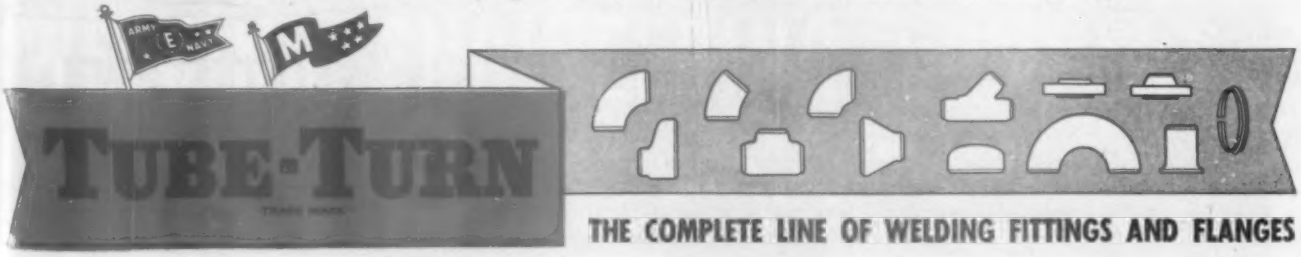


THE COMPLETE LINE OF WELDING FITTINGS AND FLANGES

Welding Big Condenser Flanges

The proper technique for welding large condenser flanges to secure a finished job without warpage.

By **JOSEPH S. WRIGHT**

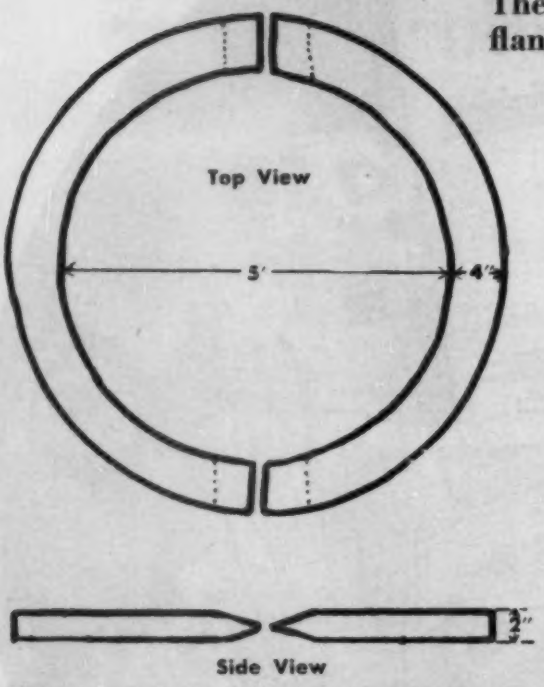


Fig. 1—Top and side views of condenser flange showing method of fabrication from two flat bars bent into semicircles.

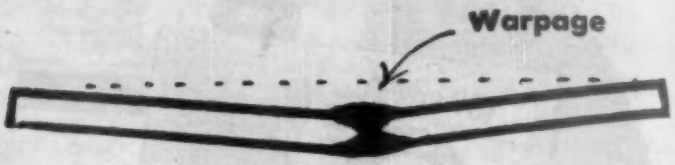


Fig. 2—Side view of flange showing warpage due to improper welding.

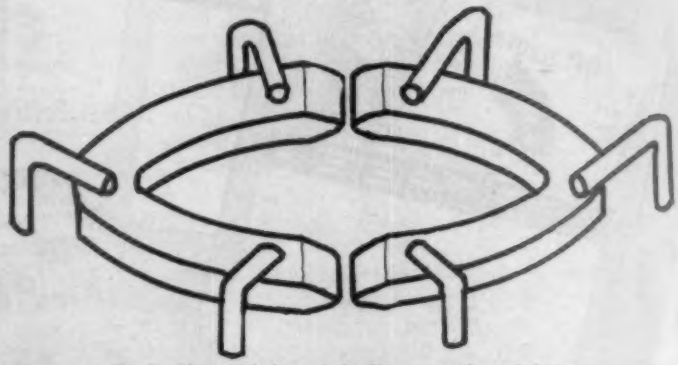


Fig. 3—The two halves of the flange are dogged down to a welding block, using six dogs as shown here.

THE flanges on the steam condensers of modern steamships are approximately 5 ft in diameter, 4 in. wide and 2 in. thick. They are fabricated by bending two heavy flat bars into semicircles and then welding (see Fig. 1).

If improperly welded, the flanges may warp and twist as shown in Fig. 2. This is undesirable because generally no more than $\frac{3}{16}$ in. is allowed for final machining, and the final warpage after welding must therefore be less than $\frac{3}{16}$ in.

Warpless Welding Procedure

The following welding procedure has been found to be successful in avoiding warpage. It is also economical.

The two halves are carefully set and dogged down to a welding block as indicated in Fig. 3. The detailed welding procedure is given in Fig. 4. First, three passes are put in one side (A). The weldor must be careful that he alternates the direction of his welding; i.e., after every pass from left to right the next pass over it should be from right to left. Welding constantly in one direction may produce a twist in the finished weld.

The ring is then turned over and redogged while a chipper cleans the butt out so that the weldor can penetrate to clean metal (B of Fig. 4). Again the ring is turned over, and the weld is completed on the first side.

When the ring is loosened, it will be found to be slightly warped. This is no cause for alarm. The slight warpage merely counteracts the final warpage to produce a perfectly flat finish.

Welding Opposite Side

The flange is turned over for the third time and dogged down securely. The dogs should be beaten down occasionally to assure that they exert a maximum pressure on the ring at all times during the welding. The welding of the flange is then finished on the opposite side (D of Fig. 4). It will be found that the slight warpage has been straightened out.

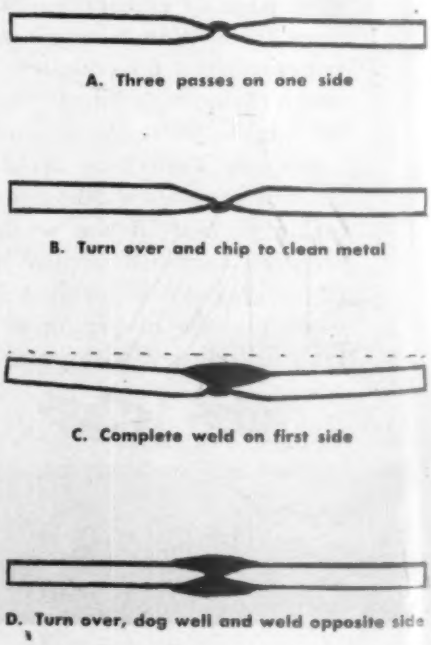
The reasons why flanges welded in this manner are always flat are:

(1) The pressure of the dogs plus the contraction of the weld metal tends to pull the sides of the flange down to the welding blocks.

(2) The slight warpage produced when the first side was welded acts to prevent the flange from warping too much in the other direction. The pressure of the dogs also resists any warpage tending to pull the flange off the flat surface of the welding blocks.

(3) As a result of these counteracting pressures, the flange is always flat when finished and free from any warpage.

Fig. 4—Welding procedure. The first side is welded complete before a single bead has been laid on the second side.


A. Three passes on one side
B. Turn over and chip to clean metal
C. Complete weld on first side
D. Turn over, dog well and weld opposite side

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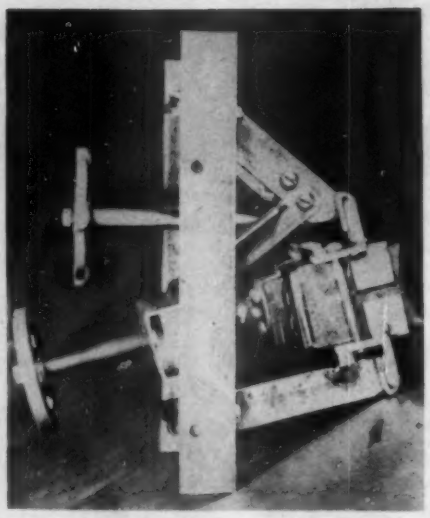
Commutator Grinder

By Rollie A. Crum

THE accompanying illustration shows a grinding fixture I developed and submitted under the Navy Employees' Suggestion Program. This fixture was designed primarily to resurface commutators on welding machines. An abrasive stone is secured in a vise from which two projecting flanges fit and slide in grooves supported by the structural framework. A rack-and-pinion arrangement is used to move the stone in an axial reciprocating motion across the surface of the commutator. The necessary pressure to hold the stone against the commutator is supplied through a feed-in screw.

In addition to expediting the grinding of commutators, this fixture eliminates the former practice of disassembling the generator, which always had to be done when the commutator was resurfaced in a lathe in the conventional manner.

The Mare Island navy yard reports an annual estimated saving of $2,400 from the use of this suggestion.



Commutator dresser developed to expedite the resurfacing of welder commutators.

» «

Three from One

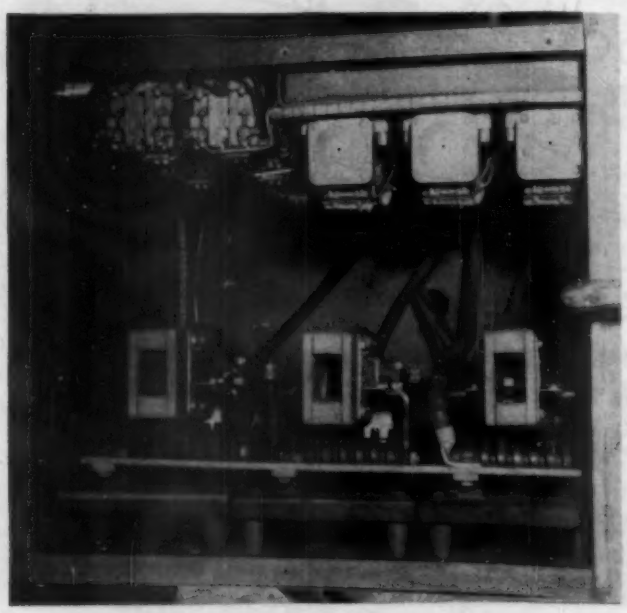
By Everette Potter

I SUBMITTED an idea to the Navy Beneficial Suggestion System at Naval Drydocks, Terminal Island, Calif., for installing three stud-welding control units in one welding machine control cabinet. Here's how it works:

The control cabinet of one 400 amp welding machine—the type used at the drydock on stud welding—was enlarged to 45 in. long, 19 in. wide and 21 in. high. The size of the machine itself limits the size of the cabinet. Three stud-welding control units were then installed in the cabinet, the d-c contactors being in parallel from the positive lead of the generator. A 1 kva, 440 to 100 volt transformer was also installed to serve as a source of supply for the control circuits. Single-phase, 440 v current is taken from the line side of the welding machine's motor starter through fuses to the control transformer.

The three control units are electrically interlocked, two units being locked out while one is in operation. This is accomplished by the use of one type AR020, normally closed relay in the circuit of each timer.

Adoption of this idea has resulted in the use of one welding machine to do the work of three. A saving of time and labor in transportation and installation is effected by the use of one compact piece of equipment, and approximately 85% less power is required. Finally, the unit may be constructed so that the welding machine can be used in a normal way when it is not required for stud welding.



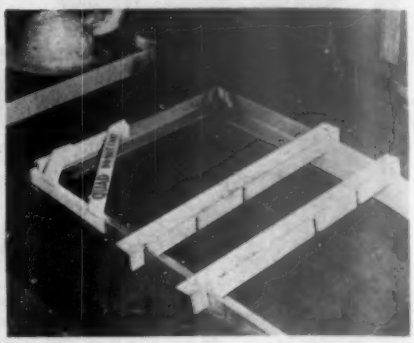
The redesigned control box which enables one welding machine to do the work of three.

» «

Grating Layout Jig

By Victor Labadie

FOR some reason it was the custom at Marinship Corp., Sausalito, Calif., to fabricate gratings of angle irons by holding the angles by hand. Warpage frequently resulted, even though an extra worker was required on the job. Inasmuch as the gratings have to be set according to specifications, warpage always made it necessary for us to "re-do the job" with consequent waste of material.



Jig for the fabrication of grating frames from angle irons. The left assembly of U-formed members and cross ties holds a square corner during welding; the slotted angles in the center hold the sides of the frame parallel.

I suggested to the Labor-Management Committee that the difficulty could be overcome through use of a layout jig to build these gratings. The idea of the jig which I designed was accepted. It consists of a pair of inverted "U" members set at right angles to each other and connected by cross ties. These members are placed over the angles to be welded to hold them in position during welding. An absolutely square joint is thus provided.

As a further development, I provided for slotted spacer angle bars to extend between parallel angles. These hold the frame angles parallel to each other and keep them rigidly in alignment while the corners are being welded. The cross ties are slotted so that they can take care of the various sizes of gratings used in our shipbuilding program.

This simple jig cost only $2 to fabricate. It enables joints to be welded absolutely square and eliminates the labor of one man in the fabrication of the gratings.

You can weld Studs on Flat Plates

with PROGRESSIVE PRESS WELDERS

PROGRESSIVE field engineers, backed by a greatly expanded staff of design and application engineers selected from the resistance welding industry for their breadth of experience and "results", will be glad to help you simplify and speed up your assembly and welding operations.

PROGRESSIVE projection-welding is one of the simplest methods there is to attach one part to another—brackets to larger pieces, forgings to stampings, etc., etc.

Welding dies are simple, hold studs to close tolerances for position. Just drop the parts in place, press a button, and the parts are attached FOR LIFE.

In the example illustrated above, use of standard PROGRESSIVE Press Welders and PROGRESSIVE-ENGINEERED set-up, a number of customary operations are eliminated and yet a BETTER PRODUCT is turned out.

The exact equipment needed for an operation like this depends of course on production quantity. The particular installation shown is being used for high production.

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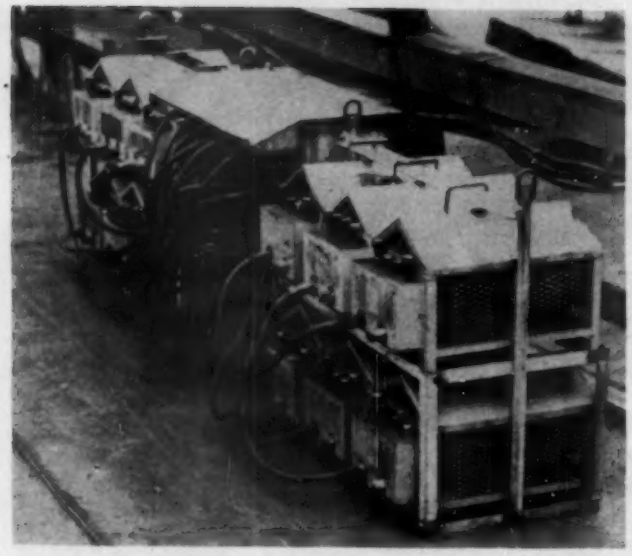


Racks for welding grids. Made out of angle iron, each rack holds six grids.

Welding-Grid Racks

By Ernest R. Bothroyd

I GOT tired of seeing welding grids all over the place at the Boston navy yard, so I submitted an idea under the Navy Employees' Suggestion Program to overcome this difficulty. My suggestion was merely a structural framework made of angle iron that will hold six welding grids.

The use of this rack is reported to reduce to a minimum dislocation and damage to the grids and equipment. Since adoption of the suggestion, 300 racks, accommodating 1,800 grids, have been made up and placed into use at the Boston yard. Besides effectively reducing the time that is lost by weldors in looking for grids, these racks have a definite safety value.

» «

Radiographic Film Holder

By John H. Cusick

THE radiographic examination of welded joints (by gamma rays) requires the placement of the film and a lead backing plate over the weld during exposure to the penetrating rays emanating from a radium capsule placed on the opposite side of the weld. Holding of the film and plate by makeshift methods was slow, and difficulties were encountered in obtaining the desired props or supports when needed at the Mare Island navy yard.

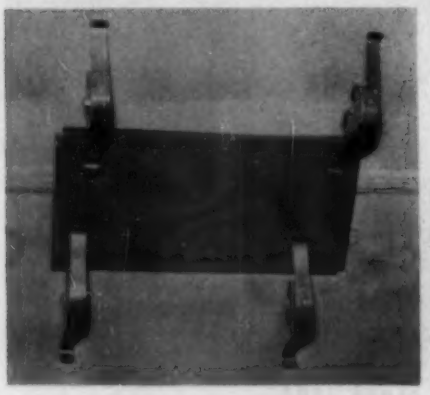
To hold the film in place, I devised an efficient, handy clip which utilizes a small but powerful horseshoe magnet. Several of these magnetic clips can be economically made up and kept on hand for immediate use as needed. They can be quickly and conveniently set even in limited areas, permitting the film to be accurately positioned with a minimum of time.

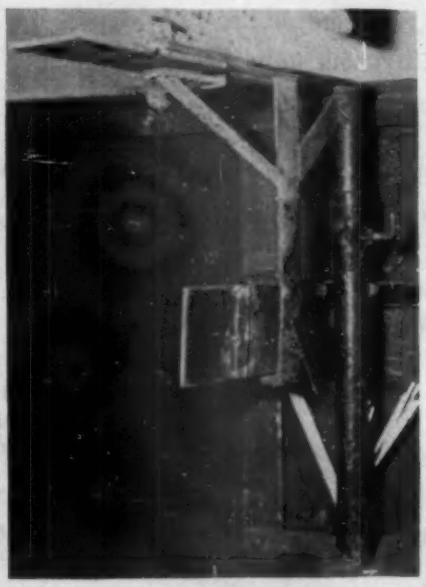
The accompanying illustration shows four of the clips now in use at the yard. The magnet holds the clip firmly on any ferrous material and can easily be adapted for other uses.

The use of these clips saves considerable time and expedites urgent radiographic examinations. The yard reports an annual saving of more than $600 as a result of my suggestion, submitted under the Navy Employees' Suggestion Program.

» «

Magnetic clips designed to hold film and backing plate in position for gamma-ray inspection of welds.





Adjustable jig used for student welding at the Seneca, Ill. shipyard of Chicago Bridge and Iron Co.

Student Welding Table

By Leroy Christianson and E. Kennedy

THE possibility of serious accidents to student weldors is always a problem in either a welding school or in production shops. Part of the hazard results from the student's inability to hold test plates securely in place during the weld.

A legless welding table with an adjustable jig mounted on the top overcame a great deal of the hazard at the Chicago Bridge and Iron Company's Seneca (Ill.) shipyard. We presented the idea as a suggestion to the Labor Management Committee, which promptly adopted it.

To avoid the problem of buying a special table for this purpose, we decided to build one entirely from scrap. This table is suitable for use in any welding position. The upper part of the jig accommodates any desired angle for vertical welding, and the uppermost part of the jig is suitable for overhead. Flat welding is accomplished when the table is in its normal position.

There are numerous safety advantages to this type of legless table. First of all, there is no scrap under the table for the operator to slip and fall on. There are no shelves and brackets from which pieces of steel might slip off to result in foot injuries. Finally, the table is readily accessible for cleaning and sweeping.

» «

Attaching Cable Lugs

By James W. MacKinnon

IN THE past the majority of all lugs were attached to welding and other electrical cables by means of solder or by a solderless method using a barrel-type friction-held lug. A hydraulic press was introduced at the Boston navy yard to attach lugs to the cable without solder by using a hydraulic plunger. Forty to 50 strokes were necessary to attach a lug by this method, resulting in excessive fatigue to the operator.

To ease the job and save time, I submitted an idea for using an air-operated chipping hammer in the Navy Employees' Suggestion Program. The idea was accepted, and a simple and sturdy machine was constructed (see picture). It was mounted on blocks with rubber absorbers to lessen the noise, and the holder was equipped with a keyway to prevent the hammer from turning as its successive blows drove home.

Since this method was adopted, an increase in production has been noted along with a decrease in worker fatigue. Substantial annual savings have also been made possible.

Air-operated chipping hammer for attaching lugs to cable. Formerly a hydraulic press was used for this job.

23 YEARS AGO A. O. Smith's unending research to improve weld quality, uniformity, and tensile strength produced the now standard process of applying heavy coatings to electrode wire by extrusion. Weld porosity was virtually eliminated, and SMITHway welds developed tensile strengths substantially greater than the parent metal.

Electrode Research in 1922 Leads to Vital Aircraft-Part Production in 1945

THIS YEAR the continuous march of SMITHway welding research—toward a combination of high strength, high ductility, and utmost dependability—makes possible the mass production of welded landing gears for heavy aircraft such as the B-17, B-24, C-47, and B-29, using types of steels not previously welded in production.

The Proof Is in Production

In its own plants, on parts and products of every size and shape, large and small, A. O. Smith uses more than 320,000 SMITHway Electrodes every day. Millions more are used in the plants of other manufacturers.

And while constant *production* proves their quality and uniformity, constant *research* in A. O. Smith laboratories seeks to improve still further the electrodes that are made *by* welders *for* welders.

For detailed specifications on SMITHway Certified Electrodes and their application to specific welding jobs, send for the SMITHway Welding Catalog.

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On the Job

Submerged-Melt Installation

A MANUFACTURER of water-supply equipment stepped up production of a shutter-type strainer for use in deep-water well pumps 300% by replacing the former procedures of mechanized and manual arc welding with the submerged-melt process. Superior appearance and improvements in weld quality were also gained by the new automatic installation.

First step in the production of shutter strainers is to form $\frac{3}{16}$ in. ingot iron plate into cylinders. The longitudinal seam is then tack welded in position for the making of the longitudinal weld (Fig. 1). Previously, the longitudinal seam had been arc welded with the automatic welding head shown in the picture; slight alterations permitted the same head to be used for submerged-melt welding, which is accomplished at a speed of 35 in. per minute.

After several such cylinders have been welded and properly slotted, they are joined together circumferentially to make a strainer unit. To do this, connecting bands of the same material are fillet welded to the ends of each section (Fig. 2). This was formerly a hand welding job, but with the new installation the fillets can be welded automatically while the assembly is being rotated at a uniform speed on motor-driven rollers. The stationary welding head and rod reel are supported above the work by a pillar-crane arrangement. A suction "melt recovery" unit is used to collect the unfused melt for reuse.

Details of the welding head used to make the fillet welds on the connecting bands are given in the picture (Fig. 2). The operator does not need to wear any special equipment since the process is carried on without flash, spark or fumes. All necessary controls are concentrated on the welding head. Bare welding rod is fed automatically from the 25 lb rod reel appearing in the upper part of the picture. Little or no slag cleaning is required after welding.

Building an Oil Refinery

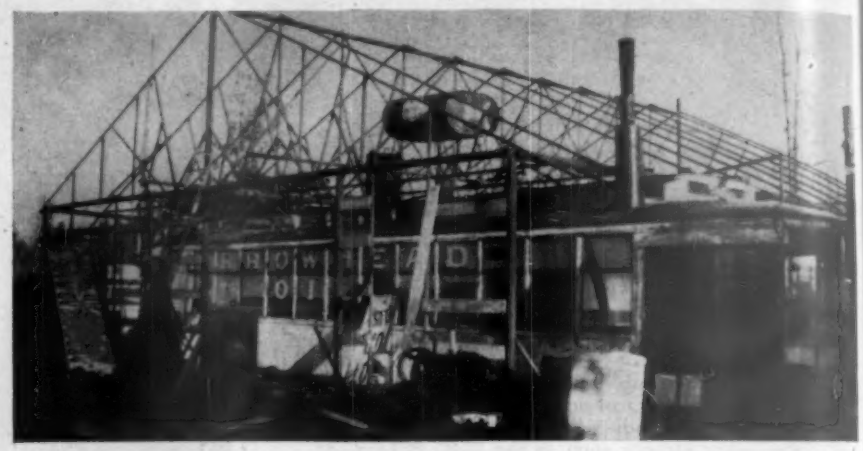
SOME of the most unusual welding jobs have been accomplished by job weldors and the owners of relatively small businesses. R. W. Oettel, who conducted an oil refining business in a discarded street car at Duluth, Minn., furnishes an outstanding example.

Mr. Oettel needed larger quarters for his small oil refinery plant so he erected a steel-framed building, 40 ft square. The frame was constructed by welding boiler tubing and a few pieces of angle iron at a small fraction of the cost of a wooden building. Mr. Oettel built the building himself in two months, with about 120 hours of help from neighbors. His problem was complicated by the fact that he had to build around the streetcar as his refinery equipment had to stay in running condition.

In describing the welded structure, he wrote:

"The building is made of 2-in. and 4-in. steel boiler tubing. The measurements are 40 by 40 ft, 19 ft to ridge with 23-ft rafters. There are no posts nor obstructions to interfere with inside floor space as an X-frame between the uprights carries all the weight of the roof.

"To cover the building, I tack welded 16 penny nails (35 lb of them) to the pipe and then nailed on fire-resistant insulating boards. This will later be covered with an asbestos-cement board. All door and window casings are of 2½ by 2½ by $\frac{1}{4}$ in. angle iron welded to the frame."



Courtesy, The Lincoln Electric Co.

View of R. W. Oettel's partially completed oil refinery, showing the framework and roof connections of welded tubing. Note the streetcar around which the structure was erected.

Fig. 1—A rolled form with the joint tack welded in position for the longitudinal weld by the submerged-melt process.

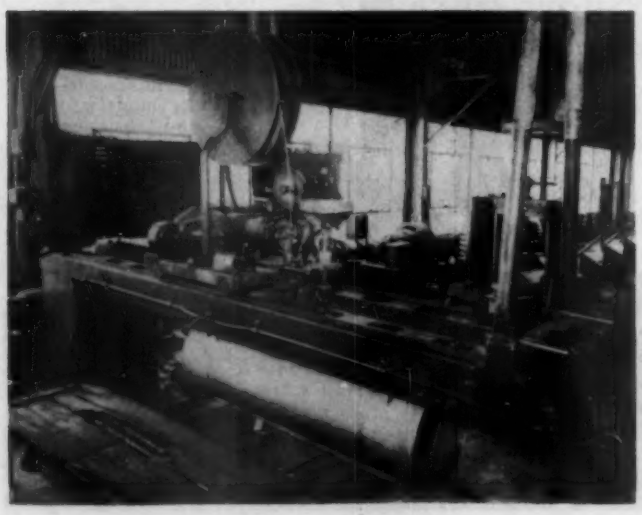


Fig. 2—Details of the welding head used to make the fillet welds on the connecting bands of the strainer unit.

Photos Courtesy, The Linde Air Products Co.

R-W Induction Heater

BY USING elements of a standard resistance welder as components, a 60-cycle induction heater was built for a shrink-fitting job at a Detroit plant engaged in the manufacture of military tanks. The job

Standard stock subassemblies from resistance welders were employed in the design of this 60-cycle induction heater. Heating time is 60 to 90 seconds.

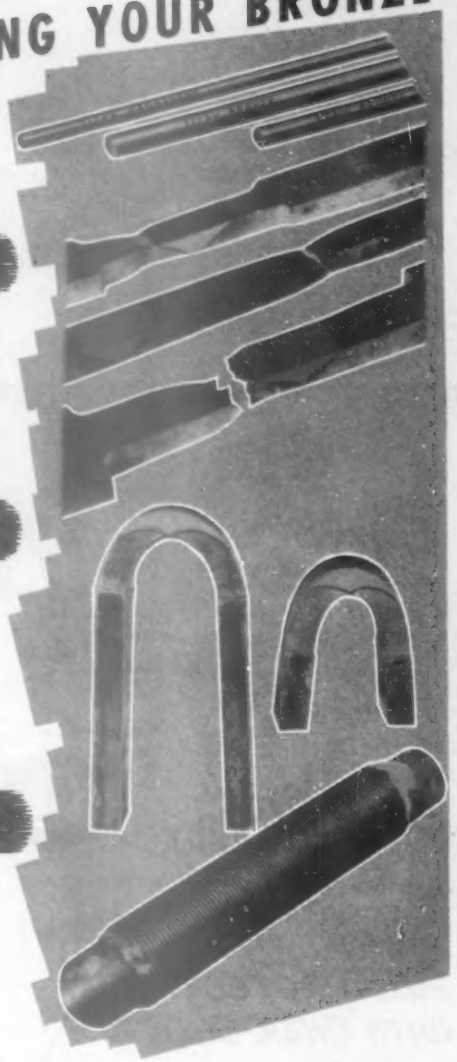
consisted of heating chrome-moly steel suspension arms so that spindles could be shrink fitted into the bores. Each bore had a 4½-in. diameter with 92 serrations to be aligned with the same number of serrations in the spindle. To permit the spindle to be inserted, the diameter of the bore had to be increased by some 0.011 to 0.012 in., and this required the suspension arm to be heated up to 500 F. This temperature could not be exceeded without altering the metallurgical characteristics of the metal.

Engineers of the Progressive Welder Co., Detroit, recommended the use of 60-cycle induction heating and suggested that the equipment be made by assembling standard components of a resistance welder including a 100 kva welding transformer, an air cylinder, stock control units, etc.

The resultant machine (see picture) was designed to heat the bores of two suspension arms simultaneously. The current-carrying copper "loop" enclosing the workpieces was arranged so that one section of it could be raised and lowered by the air cylinder to permit the insertion and removal of the suspension arms. When current is flowing, an alternating magnetic field is set up within that portion of the workpiece adjacent to the loop, and this generates the heat necessary to produce the required temperature and expansion. Transformer and conductors are water cooled as in standard resistance-welder practice in order to utilize the equipment to its maximum capacity.

THESE PROPERTIES MUST BE CONSIDERED

WHEN SELECTING YOUR BRONZE WELDING ROD



STRENGTH

Hot and cold rolled 0.2 carbon steel bars were cut in two, the edges bevelled to form a vee, then welded together with Penn Bronze. After machining, the bars were pulled apart in a tensile machine. Note failures that occurred in the steel.

DUCTILITY-TOUGHNESS

Rectangular 0.2 carbon steel bars were veed, then welded with Titan Manganese Bronze. After machining, the bars were bent in a tensile machine. The strong bond, ductility, and toughness of the weld are evident. Tests made on hot and cold rolled steel.

MACHINABILITY

The Titan Manganese Bronze weld in the middle of this steel bar proved exceptionally easy to machine. Free machinability is an important factor in reducing manufacturing costs of post-war products.

TITAN'S Metallurgists have developed the "Double Deoxidation" process to assure maximum strength, toughness, and ductility in the finished weld.

Porosity is eliminated by the use of TITAN'S practically non-fuming, free-flowing welding rods. Strict laboratory control and careful alloying are responsible for the uniformity of each rod.

Specify TITAN welding rods for your next job on steel, cast iron, malleable iron, wrought iron, bronze, or galvanized materials.

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Telescoping Pipe Rack

By Elton Sterrett

WITH the expansion of transcontinental trunk pipe lines, the size of pipe to be stored along the line for repairing breaks has increased, and the chore of handling the pipe imposes greater loads on the maintenance crews. To lessen the burden somewhat, the weldor for one of these trunk lines greatly improved the usual welded stand on which extra pipe joints are stored.

The usual rack consists of pairs of risers supporting transverse members. The risers extend above the horizontal members to prevent the pipe from rolling off the rack.

One side of the rack was made as usual, with the vertical member extending some 10 in. above the horizontal supporting member, but on the other side the vertical leg was trimmed flush with the horizontal support and left open for a short piece of pipe to telescope within the leg. This piece was then fitted with a right-angle turn extending outward about 6 in. The outer side of the vertical member was cut away with a torch so that the ell could slide within it until the horizontal projection aligns with the horizontal member of the truss. Short pipes or bars are inserted in the open ends of these ells, and the large pipe can easily be rolled onto or off the truck bed without any lifting being required.

Once the large pipe has been placed, the movable portions of the rack are locked in the elevated position by bolts which pass through matched holes in each extension and support.

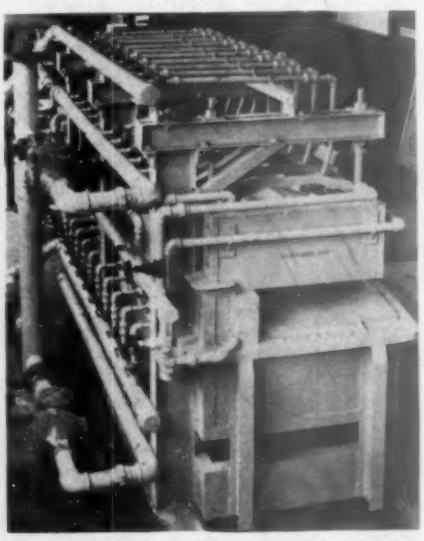
Pipe rack extensions in elevated position to hold large pipe in place. The bolt passes through matched holes in the extension and support.

» «

Pipe Fittings Improve Flow

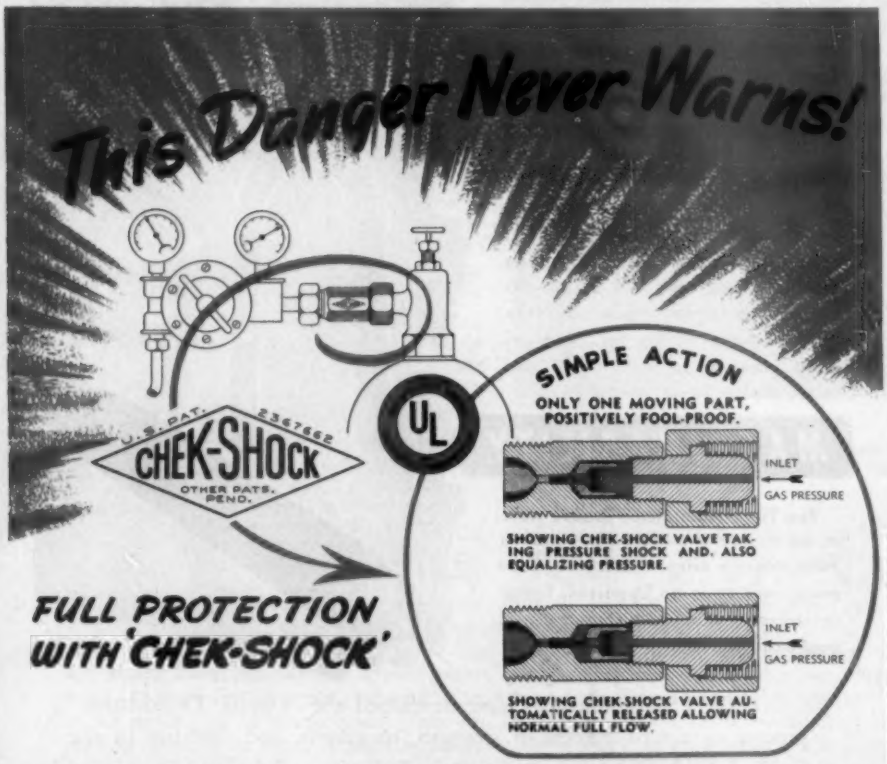
WELDING pipe fittings played an important part in solving a pressure-loss problem on the continuous gas furnaces manufactured by Selas Corp. of America. The precise operation of this process-heating equipment demands full burner efficiency—which was not being obtained because the 3 psi manifold fuel pressure experienced too great a drop by the time it reached the burners. Tests were made at various places on the branch lines, and the major loss was found to be between the manifold and the outlet end of the valve.

A different type of valve was installed, but the loss was still too great. Then welding pipe fittings were used to replace the nipples welded into the manifold. This solved the problem—largely because the funnel-shaped inlets of the fittings eliminated dead spots and provided a full-flow capacity.



Courtesy, Bonney Forge & Tool Works

Welding fittings were used in place of nipples welded into the manifold to provide a full gas flow on this furnace.



CHEK-SHOCK OXYGEN CUSHION VALVE

SOFTLY controls the vicious "jolt" of high pressure oxygen gas, thus eliminating regulator repairs and preventing possible injury to operators.

- **Will allow tank valve to be opened rapidly without damage to regulator or danger to operator.**
- **Will increase life of regulator assembly.**
- **Will eliminate possible injury to operator from burstings.**
- **Will prevent unnecessary internal wear in regulator *(as NOT necessary to release control screw before opening tank valve).***

This PROVEN automatic safety device cushions the initial "blast" of pressure when tank valve is turned on, (this uncontrolled surge which strikes like a hammer is the direct cause of most damaged regulators and accidents), when pressure slowly bleeds and equalizes then CHEK-SHOCK allows a full flow of oxygen.

PRICE IS LESS THAN ONE REPAIR BILL

 # 1. STANDARD COUPLER—for all standard size welding type oxygen regulators.
 # 2. LIGHT COUPLER—for "airplane" or soldering size oxygen regulators.
 # 3. HEAVY DUTY COUPLER—recommended for extra heavy duty work only.
 # 4. SCREW TYPE COUPLER—for removable inlet stem regulators (¼" pipe) available in standard, light, or heavy capacities.
 # 5. FOR HYDROGEN—left hand thread coupler. We also make Medical Chek-Shocks for all types of medical regulators and tank fittings (chrome plated).....$7.00 each

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Futka Machinery & Supply Co.
PHOENIX—Arizona Welding Equipment
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Another Way

KNU-VISE Clamping Devices helped to step up production

HERE, several toggle-action pliers (Model KL-450, one of many types of Knu-Vise clamping devices) played an important role in holding together parts of light-weight material during fabrication of a helicopter.

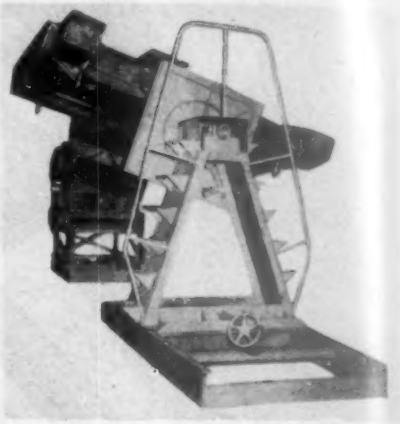
The pliers were applied with no greater effort than that used in clasping ordinary pliers. One gripping motion locked the pliers to the required holding pressure and the reverse motion released the pressure just as easily. Individual adjustments were not necessary each time the pliers were applied. The pre-set pressure was maintained throughout the entire job.

If your production requires the holding of parts in repeated operations during welding, drilling, riveting, etc., ask a Knu-Vise engineer to show you a few short cuts.

photo: Courtesy of United States Rubber Co.

KNU-VISE INCORPORATED
1336 PLUM STREET DETROIT 16, MICH.
4328 SAN FERNANDO RD. GLENDALE, CALIF.

Positioning Large Weldments



Courtesy, The Hobart Brothers Co.

The tailstock permits different lengths of weldments to be rotated for downhand welding position. The large weldment being positioned in this picture is 10 by 16 ft.

THE uses of positioning fixtures are limited only by the ingenuity of the designer and welding operator. Need of a special fixture to position the welding of large weldments at the Chain Belt Co. was fulfilled by Ray F. Lein, designer, and D. F. Lynch, welding technician, who designed and built a set-up for using a standard 6,000 lb capacity positioner in conjunction with a tailstock.

The tailstock is constructed almost entirely of welded fabrication and consists of a base framework with machined surface runners and an A-frame pedestal with machined base runners. These two component parts are held together with a heavy cross clamp and a built-in adjusting screw for setting the unit to close measurements.

The A-frame pedestal carries a faceplate with shaft, bearings, etc., that is aligned with the faceplate on the 6,000 lb positioner. Face pads and solid anchor tubes are set into the floor to tie down the tailstock unit. When the set-up is to be used for welding products of extreme differences in length, the entire framework of the tailstock is shifted to the proper anchor points and locked in place. The final adjustments are then made with the handwheel adjusting screw.

An important feature of the tailstock is a set of steps up either side of the A-frame with an accompanying guide rail which permits the operator to mount the weldment in safety. Another unique feature is the design of the adapter brackets for fastening the parts to the faceplates. These adapters are used to hold parts in line and in the same square plane. Weldment designs call for sections varying in width from 2 ft 10 in. to 10 ft 10 in. and in lengths up to 15 ft. The standard positioner can be used separately from the tailstock on smaller weldments.

Awkward-to-handle frames, hoppers, casings, and large buckets in a wide range of sizes have been welded in this combination of positioning unit and tailstock. Good results are being obtained from the standpoints of lower unit cost, safer handling and the ability to obtain downhand-position welds with better uniformity in overall sizes of large weldments.

THE CHAMPION

RIVET COMPANY

CLEVELAND, OHIO

EAST CHICAGO, IND.

Welding at the Water Line

WELDORS are called upon to do all kinds of jobs, but Martin Friedmann, Jr., a returned veteran who has established his own welding shop in Norfolk, Va., recently got a call that was unusual even for the welding business.

The job handed him was to put a new shell and deck plating on a piledriving barge without docking the boat because the piledriver had to be used all the while that the welding was going on.

The original steel hull of the barge had become pretty well battered through the rough treatment it received in construction work during years of service, and, like an old horse, the ribs could be easily counted. To overcome this fault, it was decided to weld new plates right over the original hull from the water line to the deck.

Keeping in mind the fact that the piledriver couldn't be taken out of service, Friedmann solved one problem by holding the shell plates in position by bolts until they could be permanently affixed to the old hull by plug welds. The plug welds were made through 1 by 2½ in. slots staggered on 18-in. centers throughout the length of the plate. Friedmann then made a continuous overhead fillet weld along the bottoms of the plates as well as a continuous weld along the tops of the plates at the deck line. Finally, the plates were joined to one another by vertical welds, as shown in the picture.

Weldors can make a living by lying down, but they must be careful not to get wet.

» «

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- *Sure of Long, Dependable Service Without Governor Trouble*

Pierce Governors are precision control equipment—the products of many years of experience by the world's largest governor manufacturer in meeting and solving governing problems.

They are standard equipment on many of the world's finest complete-unit engine-driven arc-welders—and preferred equipment for thousands of "home-made" welding units. Pierce Governors deliver the goods. They compensate for variations in load instantly—allowing no perceptible lag between striking of the arc and complete recovery of current characteristics. They never gum or stick. They serve with complete efficiency—and without repair or adjustment—often for longer than the engines themselves.

When you buy new arc-welding equipment, specify Pierce governing. If your present equipment is not Pierce-governed, write for full information and the Pierce catalog.

THE PIERCE GOVERNOR COMPANY, INC.
1607 OHIO AVENUE • ANDERSON, INDIANA
Manufacturers of Pierce Precision Governors and Sisson Automatic Chokes

Jack Extension

By Charles C. Lynde

WHEN it became necessary to fasten down a pipe carrying fluid pumped under high pressure, it was found easier to work from the structure overhead than to improvise a clamp at pipe level.

To permit adjustment of the hold-down, the weldor fabricated a base on the end of a pipe standard and welded this extension to the base of the original jack unit, adding braces to take care of possible out-of-alignment thrust.

The jack (top) is welded to the long extension and connected to the saddle on the horizontal pipe by a short nipple.

A saddle-type base was then formed to fit closely over the pipe to be anchored and was welded in place. The saddle was formed with an ordinary pipe collar at the top, which could be joined to the bottom collar of the jack extension by means of a short pipe nipple. By screwing out on the jack thread, the pipe was forced downward and secured against vibration.

If necessary, the span between the pipe support and overhead stop may be elongated simply by removing the connecting nipple and replacing it with a longer one. The spread between nipple lengths can be taken care of by adjustment of the jack screw.

COMPARISON OF THE VARIOUS TONS AND POUNDS IN USE IN THE UNITED STATES

Troy Pounds	Avoirdupois Pounds	Kilograms	Short Tons	Long Tons	Metric Tons
1	.822 857	.373 24	.000 411 43	.000 367 35	.000 373 24
2	1.645 71	.746 48	.000 822 86	.000 734 69	.000 746 48
3	2.468 57	1.119 73	.001 234 29	.001 102 04	.001 119 73
4	3.291 43	1.492 97	.001 645 71	.001 469 39	.001 492 97
5	4.114 29	1.866 21	.002 057 14	.001 836 73	.001 866 21
6	4.937 14	2.239 45	.002 468 57	.002 204 08	.002 239 45
7	5.760 00	2.612 69	.002 880 00	.002 571 43	.002 612 69
8	6.582 86	2.985 93	.003 291 43	.002 938 78	.002 985 93
9	7.405 71	3.359 18	.003 702 86	.003 306 12	.003 359 18
1.215 28	1	.453 59	.0005	.000 446 43	.000 453 59
2.430 56	2	.907 18	.0010	.000 892 86	.000 907 18
3.645 83	3	1.360 78	.0015	.001 339 29	.001 360 78
4.861 11	4	1.814 37	.0020	.001 785 71	.001 814 37
6.076 39	5	2.267 96	.0025	.002 232 14	.002 267 96
7.291 67	6	2.721 55	.0030	.002 678 57	.002 721 55
8.506 94	7	3.175 15	.0035	.003 125 00	.003 175 15
9.722 22	8	3.628 74	.0040	.003 571 43	.003 628 74
10.937 50	9	4.082 33	.0045	.004 017 86	.004 082 33
2.679 23	2.204 62	1	.001 102 31	.000 984 21	.001
5.358 46	4.409 24	2	.002 204 62	.001 968 41	.002
8.037 69	6.613 87	3	.003 306 93	.002 952 62	.003
10.716 91	8.818 49	4	.004 409 24	.003 936 83	.004
13.937 50	11.023 11	5	.005 511 56	.004 921 03	.005
16.075 37	13.227 73	6	.006 613 87	.005 905 24	.006
18.754 60	15.432 36	7	.007 716 18	.006 889 44	.007
21.433 83	17.636 98	8	.008 818 49	.007 873 65	.008
24.113 06	19.841 60	9	.009 920 80	.008 857 86	.009
2430.56	2000	907.18	1	.892 87	.907 18
4861.11	4000	1814.37	2	1.785 71	1.814 37
7291.67	6000	2721.55	3	2.678 57	2.721 55
9722.22	8000	3628.74	4	3.571 43	3.628 74
12 152.78	10 000	4535.92	5	4.464 29	4.535 92
14 583.33	12 000	5443.11	6	5.357 14	5.443 11
17 013.89	14 000	6350.29	7	6.250 00	6.350 29
19 444.44	16 000	7257.48	8	7.142 86	7.257 48
21 875.00	18 000	8164.66	9	8.035 71	8.164 66
2722.22	2240	1016.05	1.12	1	1.016 05
5444.44	4480	2032.09	2.24	2	2.032 09
8166.67	6720	3048.14	3.36	3	3.048 14
10 888.89	8960	4064.19	4.48	4	4.064 19
13 611.11	11 200	5080.24	5.60	5	5.080 24
16 333.33	13 440	6096.28	6.72	6	6.096 28
19 055.56	15 680	7112.32	7.84	7	7.112 32
21 777.78	17 920	8128.38	8.96	8	8.128 38
24 500.00	20 160	9144.42	10.08	9	9.144 42
2679.23	2204.62	1000	1.102 31	.984 21	1
5358.46	4409.24	2000	2.204 62	1.968 41	2
8037.69	6613.87	3000	3.306 93	2.952 62	3
10 716.91	8818.49	4000	4.409 24	3.936 83	4
13 937.50	11 023.11	5000	5.511 56	4.921 03	5
16 075.37	13 227.73	6000	6.613 87	5.905 24	6
18 754.60	15 432.36	7000	7.716 18	6.889 44	7
21 433.83	17 636.98	8000	8.818 49	7.873 65	8
24 113.06	19 841.60	9000	9.920 80	8.857 86	9

WHEN WE SAY *EXCEPTIONAL FORMABILITY*...

here's what we mean!

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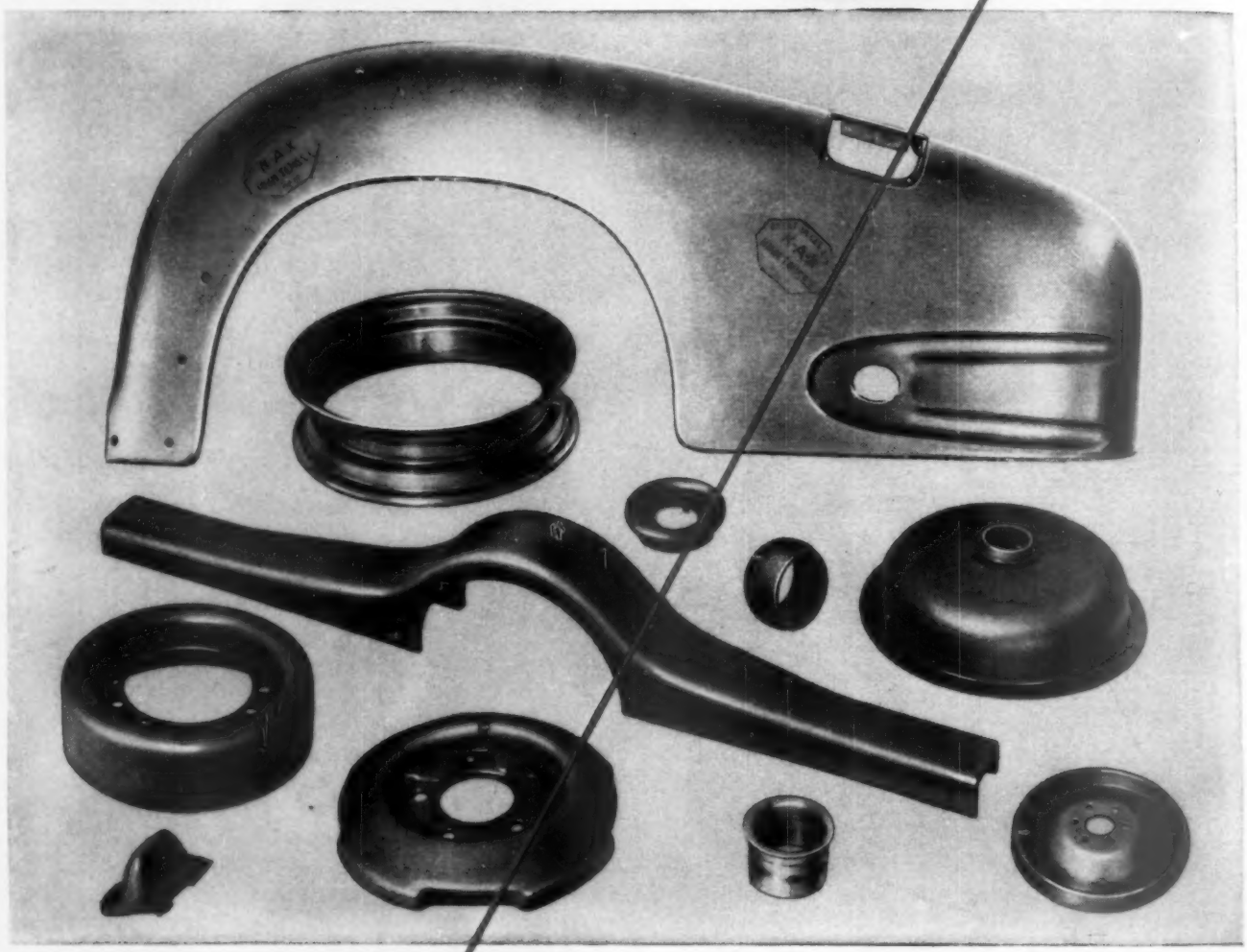
HIGH-TENSILE STEEL



These are not an artist's conception of shapes that can be fabricated with a high-strength steel. They are actual parts produced with *N-A-X High-Tensile* by manufacturers who have learned that *great strength and exceptional formability* are available in one great steel. ¶ If you have a problem that involves the fabrication of high-strength steel—if you have a product that could command the market if it were stronger, longer-lasting or lighter—consult Great Lakes Steel Corporation.

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N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
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The Technical Slant

Thumbnail sketches of new engineering and business books which the editor deems worthy of his readers' attention.

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE, *eighth edition. Published by the Lincoln Electric Co., Cleveland, Ohio, 1945. Simulated leather, 6 x 9 in.; 1,312 pages. Price $1.50.*

The *Procedure Handbook of Arc Welding Design and Practice* has been entirely revised. In its eighth edition, the book includes details of the most recent welding methods and techniques, many of which played a dominant part in the winning of the European and Pacific wars.

Special effort has been made by the authors to provide complete information to help those in all fields of industry obtain the greatest possible benefits from the process of arc welding, both in the design and construction of various parts and products and in the use of the process as a maintenance tool. The text includes many significant welding applications developed in various phases of war production which have hitherto not been published due to restriction.

Following the style of previous editions, the subject matter is presented in eight principal sections. These are: Welding Methods and Equipment, Technique of Welding, Procedures, Speeds and Costs, Weld Metal and Methods of Testing, Weldability of Metals, Welded Steel Construction, Designing of Arc-Welded Structures and Typical Applications of Arc Welding in Manufacturing, Construction and Maintenance. This new book should be a welcome addition to the literature of everyone interested in arc welding.

» «

DICTIONARY OF ENGINEERING AND MACHINE SHOP TERMS. By A. H. Sandy. *Published by Chemical Publishing Co., Inc., Brooklyn 2, 1944. Cloth, 5½ x 8½ inches; 153 pages. Price $2.75.*

The author, a British lecturer and instructor, spent many years compiling the definitions of the important shop and engineering terms published in this compact volume. The definitions are clear and concise, a feature which should make this dictionary useful to the student, shopman and engineer. Some trade names are included, but most of those listed are of British origin.

» «

AMERICAN MACHINIST HANDBOOK, *eighth edition. By Fred A. Colvin and Frank A. Stanley. Published by McGraw-Hill Book Co., New York City, 1945. Simulated leather, 4¼ x 6¾ inches; 1,546 pages. Price $5.*

Much of the new material presented in the eighth edition of the *American Machinist Handbook* deals with developments that were brought out during the war in the machine and tool field. Particular attention is paid to the new standards of truncated Whitworth threads as an aid in securing interchangeability between threads with the regular round top and bottom of the Whitworth and with a modified thread having a flat or truncated top and bottom.

There is also included a considerable number of new tables of standards, and new material is presented on such subjects as thread lobes for screw machine cams, knurling tools for automatics, a new method for calculating circular form tools, practical points for threading operations on automatics, etc.

Extensive changes have been made in the section dealing with milling practices. Latest available research data from the leading manufacturers of milling machines and cutters are given as well as the results of the practical use of negative-rake carbide tools for milling and turning. There is also considerable new material on beveling and other gearing. With this wealth of new data, the *American Machinist Handbook* can well continue in its role of the world's most widely used technical handbook.

» «

PIPING HANDBOOK, *fourth edition. By Sabin Crocker. Published by McGraw-Hill Book Co., New York City, 1945. Simulated leather, 4½ x 7 inches; 1,376 pages. Price $7.*

The scope of the *Piping Handbook* has been extended in its fourth edition to include chapters on gas piping, refrigeration piping, hydraulic power, transmission piping and corrosion. The abstracts of existing codes, dimensional standards and material specifications for piping have been revised and brought up to date. Abstracts have also been added for those standards and codes formulated since the publication of the last edition.

In addition to changes required to keep the handbook abreast of technical developments, a continual effort has been made to increase its usefulness by improving tables and charts, citing additional authorities, providing more cross references and supplementing the index.

The author has sensed the increasing importance of piping systems in modern power plants, in distribution systems and in industrial operations. With this thought in mind, he is striving to bring together the specialized problems which justify a handbook devoted exclusively to the subject of piping.

» «

MACHINE TOOL GUIDE. *By Tom C. Plumridge, Roy C. Boyd and James McKinney, Jr. Published by American Technical Society, Chicago, 1945. Cloth, 8½ x 11 inches; 762 pages. Price $7.50.*

In reality, the *Machine Tool Guide* combines in single volume the catalogs of many manufacturers so that their products may be easily compared. In this one volume appear drawings, dimensions, specifications and all of the important data of 61 manufacturers of machine tools and machines such as automatics, boring machines, broaching machines, contour machines, drilling machines, duplicators, gears, grinders, hobbing machines, lathes, milling machines, planers, presses, shapers, slotters and tapping machines.

This guide is an authentic, comprehensive, reference book for all who purchase or use machine tool equipment.

» «

PLASTICS, *third edition. By J. H. DuBois. Published by American Technical Society, Chicago, 1945. Cloth, 5½ x 8½ inches; 447 pages. Price $4.*

The third edition of *Plastics* offers a simplified presentation of the manufacture and use of important plastic materials and products, with tables of their properties and such design information as might reasonably be required by engineers and designers. A new section has been added, incorporating the latest developments in the plastic field.

The nice feature of this volume is that it was written for the user as much as for the manufacturer. The data given are right up the alley of a man who hasn't a lot of time to spend in figuring out the details of chemistry or complex manufacturing problems. Here he will learn without too much difficulty how all plastic materials are used, what can be made of them, where to use the various kinds, what types of materials will withstand fire or can be re-melted. And the fabricator will find information on how to form the various plastic materials into commodities, as well as on what is required in the way of tooling, machining, etc.

Some excellent historical information traces the discoveries, developments and experimentations in all types of plastics. All in all, this is an excellent book for anyone interested in or working with plastics.

» «

HOW TO HANDLE COLLECTIVE BARGAINING NEGOTIATIONS. *Published by National Foremen's Institute, Inc., Deep River, Conn. 1945. Fibrikoid, loose leaf, 9½ x 11¼ inches; 42 pages. Price $5.*

This volume is an especially prepared report based on an exhaustive survey which was conducted by the National Foremen's Institute at the insistence of a client. It points out clearly the errors and fallacies that have tripped managements in bargaining negotiations in the past, and pointers are also given on how to avoid these costly mistakes in the future.

In this compact volume of seventeen sections are discussed such subjects as management negotiations, resolving contest issues, promotion and merit increases, unionization of foremen, the closed shop, getting the contract across, conditioning the union. It is a book that should be of considerable assistance in handling problems of labor relations.

TYPE W-56

Only TYPE W-56 offers ALL these features

Welds have excellent surface and profile appearance

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Deep-penetrating, spray-type arc

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Welds in all positions

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A-c or d-c operation

SPECIFICALLY designed for welding carbon-molybdenum steels, in all positions, this new G-E electrode can also be used successfully on other low-alloy, high-tensile materials. W-56 is the *first* electrode to meet all of the requirements of AWS Classification E7010/E7011. And it makes possible, for the first time, the use of *either* a-c or d-c for all of these applications. Even more important, the recognized advantages of the a-c welding process are now made available to industry for high-quality welding of low-alloy, high-tensile steels in the vertical and overhead positions.

Type W-56 Welds Exceed Specifications

Heavily covered, Type W-56 provides a steady, spray-type, deep-penetrating arc which produces a weld of superior quality and excellent appearance. Its light, friable slag is readily removable and sets up rapidly, facilitating welding in the vertical and overhead positions.

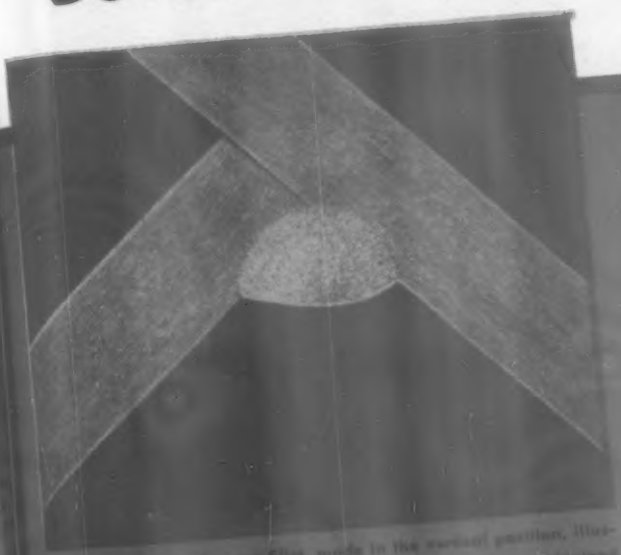
Although Type W-56 is designed for use in all positions, its superior welding qualities are most noticeable when it is used in the vertical. The bead obtained is relatively flat, with smooth uniform ripples. X-rays of plates welded in the vertical position are exceptionally clean, and the mechanical properties of specimens are well above specification requirements.

Test Type W-56 Yourself

If your welding work includes the fabrication of pressure vessels (fittings), pressure piping, or other applications involving the welding of low-alloy, high-tensile steel, try the new Type W-56 electrode. Ask your G-E arc-welding distributor for samples and see for yourself the increased welding production and superior welds obtainable with this newly developed rod. Your distributor can also provide you with detailed performance data. Or, write General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

THE FIRST E7010/E7011 ELECTRODE FOR WELDING LOW-ALLOY, HIGH-TENSILE STEELS



This single-pass fillet, made in the vertical position, illustrates the deep penetration and excellent fusion obtained with Type W-56.

Of carbon-moly steel, this transformer-radiator assembly being welded in the vertical position is typical of the applications for which Type W-56 was designed. Either d-c, as in this illustration, or reverse polarity d-c can be used.

RANGE OF MECHANICAL PROPERTIES

(Stress Relieved)

	Alternating Current		D-c Reverse Polarity	
1/8-in. Diameter				
Tensile	76,000	78,000	73,000	73,000
Yield	60,000	62,000	56,000	58,000
Elongation % 2 in.	26.0	28.0	27.0	28.0
Reduction %	67.0	73.4	62.5	71.4
5/32-in. Diameter				
Tensile	70,700	72,500	73,000	71,000
Yield	54,500	57,500	59,500	57,500
Elongation % 2 in.	28.0	29.0	26.0	25.0
Reduction %	69.0	67.0	67.0	64.5
3/16-in. Diameter				
Tensile	75,500	76,500	72,000	73,500
Yield	61,200	62,500	58,000	57,000
Elongation % 2 in.	32.0	30.0	28.0	29.0
Reduction %	68.0	67.0	64.5	67.0

ARC WELDING ELECTRODES AND EQUIPMENT

Buy all the BONDS you can —and keep all you buy

Fig. 1—Mr. Young with one of the mobile welding units assigned to the on-the-job maintenance and welding crew.

Fig. 2—The R-V-30 carry-all described in the article.

The Weldor's Maintenance Role

How important is the weldor's wartime experience going to be in peacetime? Very important, thinks this author, a maintenance weldor. His advice to fellow weldors is: Keep abreast of the new developments in the industry.

By **DON YOUNG***

Fig. 3—Weldor Young shows a section of the tail gate braced with a vertical weld.

DURING the last few years the weldor's job has included just about everything. Equipment had to be made to last the duration because it could not possibly be replaced until companies were again in fulltime civilian production.

Because of what we weldors have learned during the war in forced maintenance and rebuilding, I think we have made a permanent place for ourselves in peacetime maintenance organizations.

Saved from the Scrap Drive

As an example, I am reminded of an extensive repair job we carried out in the field, using a mobile welding unit, Fig. 1. The machine to be restored to service was an R-V-30 carry-all, Fig. 2. It had been assigned to the scrap drive, but the job we were working on required it and no extra carry-all was available. I do not have the figures, but a replacement would have run somewhere between eight and ten thousand dollars.

With only one shift, two weldors put in a tail gate (Fig. 3), a full bottom and part of the sides in less than three weeks. We corrected angles and built up sheave grooves, and turned out virtually a new machine that will show a long, safe service record.

This type of work takes the welding crew out of the odd-job and fix-it class. When we show management that rebuilding on the job by welding is profitable and the finished work dependable, we have taken a big stride.

Of course our wartime assignment was to turn out jobs that would serve as substitutes. Contracts had deadlines, and new or even good used replacements could not be had—thus the weldor was called in as a supposedly temporary stopgap. But when we turn out a job that's right and may even outlast a new replacement—that's something entirely different.

If weldors, particularly those doing on-the-job repair and maintenance

Fig. 4—It is the weldor's job, the author believes, to know all about the equipment on the job. If preformed wire cable is used exclusively instead of non-preformed —why? What are its advantages?

* Mr. Young has been a weldor assigned to on-the-job maintenance crews since 1941. At the time this article was written he was working for the Guerin Brothers Construction Co., Los Angeles, on an airport job for Douglas under Army supervision.

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Fully Conforming with Standards of Underwriters' Laboratories.

AV-10—Special lightweight AIRCRAFT torch for welding aluminum and light-gauge metals.

Gasweld Machine Cutting Torches are available for use with any flame cutting machine.

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The model WG-35 Gasweld Torch, illustrated above, is the "The torch for the hot corner", an all-around heavy-duty type. Of the same rugged construction, but slightly smaller, is the WG-25 "Gasweld"—ideal for shop and garage.

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Both types can be supplied as part of complete general welding outfits—complete with oxygen and acetylene regulators, goggles, hose and safety spark lighter.

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1. T-slots in table tops for speedier set-up of all kinds of work.
2. 135-degree tilting range from horizontal.
3. Four rugged supports for greater steadiness.
4. Two Timken bearings on spindle shafts, instead of bushings, for permanent alignment of table top.
5. Double, instead of single, tilt gear (in 3-ton size and over) to equalize load for safety, steadier operation and longer life.
6. Motor and gearing housed inside frame to prevent damage during table loading.

Other features of the most complete line of Welding and Assembly Positioners — 100 lb. to 40,000 lb. capacity — are covered in Bulletin No. 210. Write today.

RS-14

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MACHINERY COMPANY
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work, want to hold the wartime advantage they gained, they are going to have to dig in. Every month new welding jobs are successfully done which could not have been done the month before. New metals are being offered. New and better methods. I think that it is the weldor's job to know about these new metals and better methods.

Study Your Trade Magazine

A weldor who wants to assure his position in a maintenance organization after the war should take a good welding magazine. It is not enough to read it; he should study every word in every issue—study the advertisements . . . even keep some sort of a file system on the articles and ideas which he feels will be of later value to him.

The weldor engaged with the general maintenance of construction equipment should make the details of the equipment his particular interest. For instance, if a sheave groove gives better operation and longer cable life when built up with a hard metal, the weldor should know why. He should also know what other methods might accomplish the same result.

He should know the difference in cable construction. On all cranes, draglines, carry-alls, shovels and similar equipment preformed cable is used exclusively instead of non-preformed. Fig. 4 is an example. Preformed cable gives longer life; it causes less damage to sheaves and drums; it is twice as safe. The weldor should know all this.

How can he learn these things?

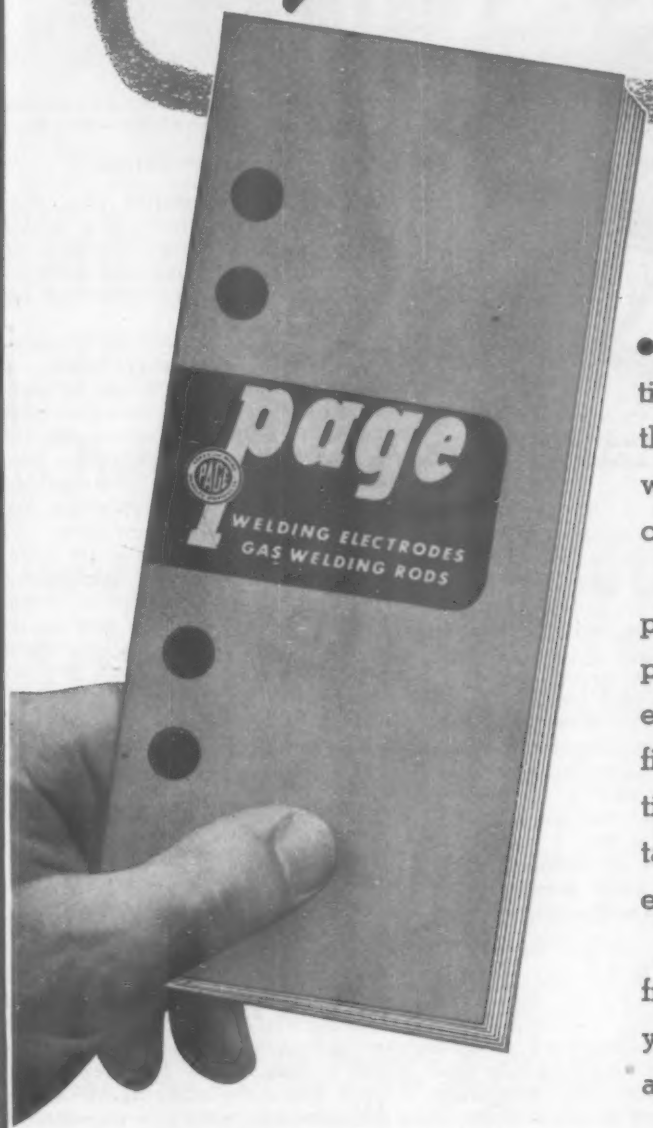
By observation and experience and cooperation with machine operators. By studying articles in the magazines for his field. By writing to equipment manufacturers for free books and bulletins. (The "Helpful Literature" section of this magazine is one way of keeping posted on what to write for.)

Suppose a new metal is offered under some trade name. Nine chances to one that new offering is described in at least one if not all of the trade magazines covering the welding field. The company manufacturing it has made every possible attempt to tell us as weldors of the new product's uses and possibilities. If we miss out on this information, we are the ones who have lost. Therefore study the advertisements and the editorial section describing new products.

I think the weldor's maintenance role is going to be just as important in peace as it was in war. But I also think that the weldor has an after-hour job to do if he expects to hold the gains he has made during the last few years.

PAGE *Welding* ELECTRODES

IT WILL SOON BE *Dog-Eared* FROM USE



● This new **PAGE** book is so informative, so complete and so easy to use, that we prophesy in many shops it will soon become dog-eared from constant use.

Twenty-eight different classes of production welding are listed. Opposite each is the recommended electrode or gas rod. Complete specifications and welding characteristics of each electrode and rod are tabulated for quick reference and easy reading.

You can get copies of this book from your **PAGE** distributor. Or, if you prefer, write to the **PAGE** factory at Monessen, Pa. Ask for DH-821.

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

New Products to Use

Flexible Tubing

★ A new type of flexible tubing, "Spiratube," is non-collapsible under plus or minus pressures and retractable to about one-eighth its extended length. Its spring steel helix core causes it to spring out,

Section of "Spiratube" flexible tubing. Sharp turns are made with only slight reduction in free-air area.

like a jack-in-the-box, to its fully extended length, and it will stay in this position regardless of whether it is working on pressure or suction. "Spiratube" has had 2½ years of service in the U. S. Navy, and it is recommended for such applications as removing welding fumes or removing dust in grinding operations.

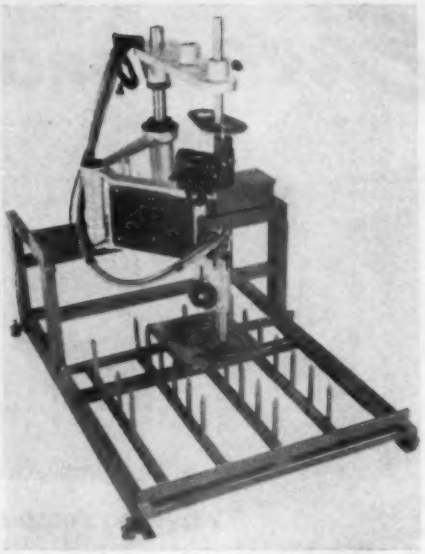
A feature of "Spiratube" construction is the method of spiral-stitching the spring core within the fabric. The inside surface is free of wire ridges, providing less resistance to air flow and no obstruction to the passage of solids. Sharp bends can be made with only slight reduction of air flow and without the use of elbows or special fittings. The standard tube is made of long-fibred duck having a bursting strength of 170 psi; the fabric is processed fire-resistant and covered with tough, durable thermoplastic. The tubing can also be made to specifications in a variety of other fabrics for special applications. There is no exposed metal inside or out (even the couplings are covered), eliminating the possibility of sparking where flammable materials are present.

"Spiratube" is furnished in standard diameters ranging from 3 to 16 in. and in lengths of 10, 15 and 25 ft. Built-in couplings permit quick joining or disconnecting. **The Warner Brothers Co., Spiratube Div.,** Bridgeport, Conn.

» «

Shape-Cutting Machine

★ The "O.M.W." is designed to cut an unlimited variety of shapes using either plywood (for small runs) or steel templates. Steel templates can easily be made from a plywood pattern by using the machine to cut them from the required thickness of plate. Either a spindle tracing device or a magnetic tracing device may be used to follow the template. The spindle roller can be held in contact with the template by the operator, or spring tension may be employed to render the operation wholly automatic. The magnetic tracing device automatically follows the steel template.



Model SC-30 "O.M.W." shape-cutting machine with semistationary base.

Shape cutting is simple with the "O.M.W." The template is fastened to the holder by a single bolt. The driving roller is then brought into contact with the template, and the machine proceeds to cut an accurate reproduction of the shape.

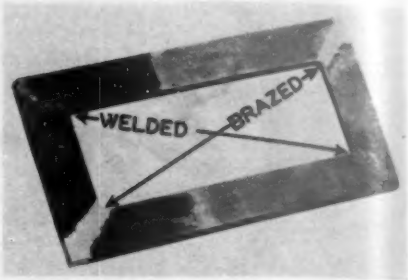
This machine can be used as either a portable or a stationary type. Its cutting range extends up to 65 in. lengthwise and 30 in. laterally. The cutting speed may be varied by adjusting rheostats on a control panel. Another feature is a handwheel that may be turned to offset the torch from the line of cut and so enable the machine to produce cuts unblemished by the initial piercing operation. **Ohmstede Machine Works,** Beaumont, Tex.

» «

A-C Electrode

★ The new "Agile-Blue" a-c electrode has been developed for all-position welding applications with low-open-circuit, transformer-type welding machines. It is suitable for the welding of light-gauge sheet metal, steel furniture, tanks of all types, ornamental structures, auto fender work, steel window frames and sashes, switch boxes, sidewalk gratings, motor housings, conveyors and all types of mild-steel production welding. Advantages, states manufacturer, are: smooth, neat weld deposits; minimum spatter loss; easy slag removal; easy operation; rapid welding. This type of electrode is expected to occupy an important place in reconversion and peacetime production. **American Agile Corp.,** Dept. E, 5806 Hough Ave., Cleveland 3.

» «



Welded and brazed joints before and after cleaning with Optimus Deoxidant No. 3.

Scale-Cleaning Solution

★ Flux and welding or brazing scale may be satisfactorily removed with Optimus "Deoxidant No. 3," an acidic product which is also being used to deoxidize the surfaces of a wide variety of metals and alloys.

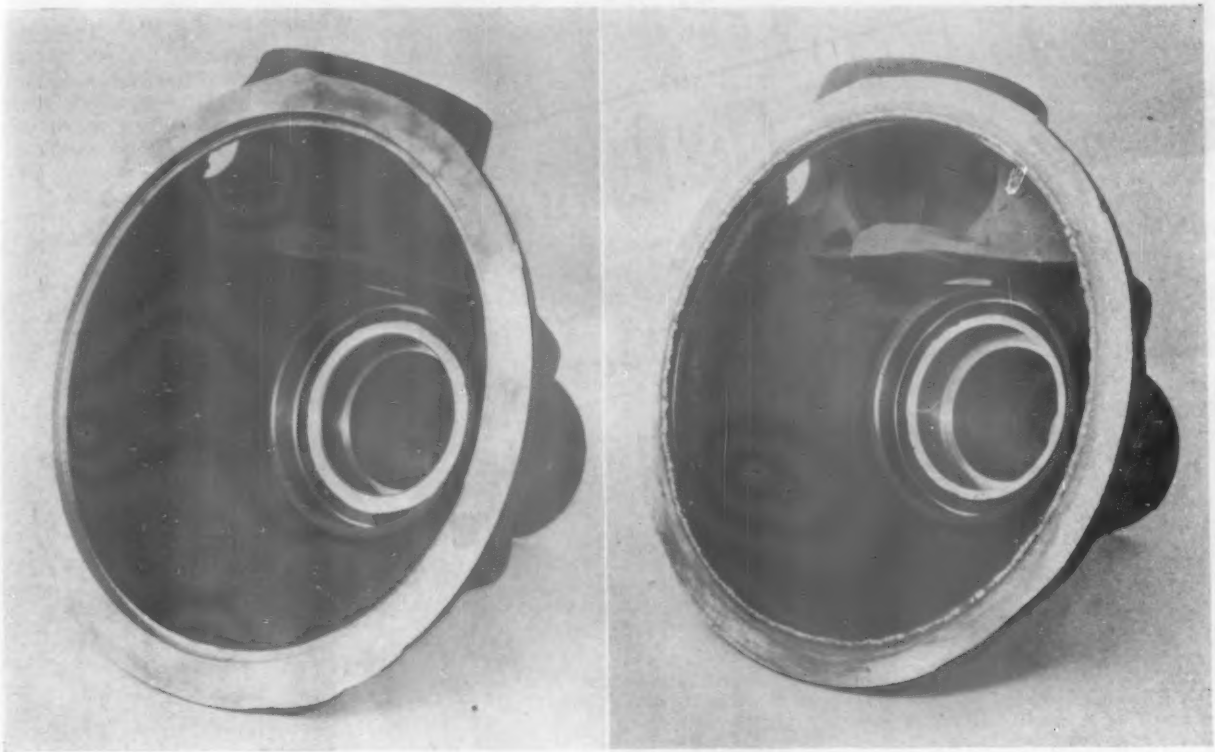
Not a bright dip and not intended to replace acid in ordinary pickling, Optimus Deoxidant No. 3 may be used on most metals as a mild deoxidant without serious etching of the surface. It is used regularly on welded steel tubing; brazed hot-rolled and cold-rolled steel; copper, brass, cast iron, bronze castings, aluminum and most aluminum alloys. Most welding and brazing scales are removed in from 5 to 15 minutes, states manufacturer. It is only necessary to deoxidize for the required time and give the work a quick rinse in hot water. **Optimus Detergents Co.,** 249 Church St., Matawan, N. J.

» «

"Deci. Point" Sliderule

★ The "Deci. Point" sliderule originally announced in THE WELDING ENGINEER for December, 1944, page 72, is now being manufactured of lightweight Dowmetal, which is not affected by climatic conditions and can, moreover, be machined to extremely close tolerances. This permits the use of a self-centering "optical groove"—a type of tongue-and-groove construction favored in optical instruments because it prevents both side play and binding. The Dowmetal core is faced with a flat white plastic on which the scales are placed by a special process.

The "Deci. Point" rule differs from other sliderules in that it will determine the precise location of the decimal point in involved expressions with results up to 19 places. Another feature is that the square root, cube root and logarithm of any number can be read at one setting of the hairline: cube root to 30-in. scale accuracy and square root to 20-in. scale accuracy. Scales of sines and tangents are also included. **Pickett & Eckel,** 53 W. Jackson Blvd., Chicago 4.



Because the groove on the inside of the flange was found to be slightly oversize, this completely machined casting was headed for the scrap pile.

Building up the groove with PHILLIPS "600" Electrode required only 35 minutes welding time. No warping occurred and the deposit was fully machinable, including the line of fusion.

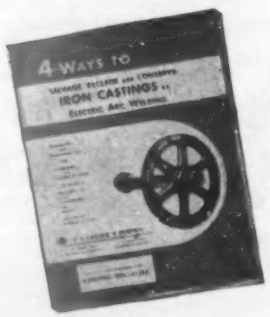
Quick, low-cost salvage of iron castings with PHILLIPS "600" Electrode

HUNDREDS of foundries and machine shops are cutting their reject losses every working day by using this simple, economical, time-tested method of salvaging gray iron castings. The savings are especially impressive when defects are found after a casting has been partly or completely machined.

Deposits of PHILLIPS "600" are *fully machinable*, even through the line of fusion. So little heat is used that no warpage occurs. The deposit is not noticeable after machining, because it is of the same color as the casting. These features, combined with the low cost of metal arc welding, constitute an ideal repair.

Procedure details are explained in our "4-Ways" book, shown at the right. Our nearest distributor will be glad to send a representative to discuss applications in your shop or plant.

THIS BOOK TELLS HOW



Our "4-Ways" manual is a complete guide to the selection of materials and procedures for arc welding cast iron. Send for your copy TODAY.

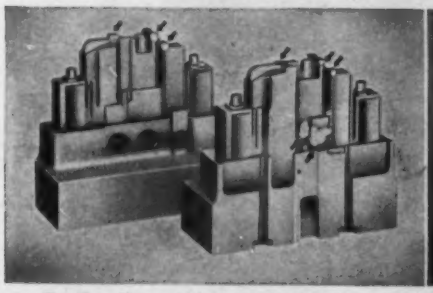
C. E. PHILLIPS & COMPANY

2730 Poplar Street
Detroit 8, Michigan

1145 E. 76th Street
Chicago 19, Illinois

Distributors in all principal cities.

MANUFACTURERS AND DISTRIBUTORS OF WELDING ELECTRODES AND SPECIALTIES



● Costly dies welded with Eureka Tool & Die Electrodes. These intricate units were saved at a small fraction of their replacement cost and were back into operation with minimum down-time. Man hours, material and production time saved.

● When practical, die units can be compositely fabricated by welding. Above die units compositely constructed with Eureka Tool & Die Electrodes. Heat treatment unnecessary, other than tempering. Last operation is finish machining.

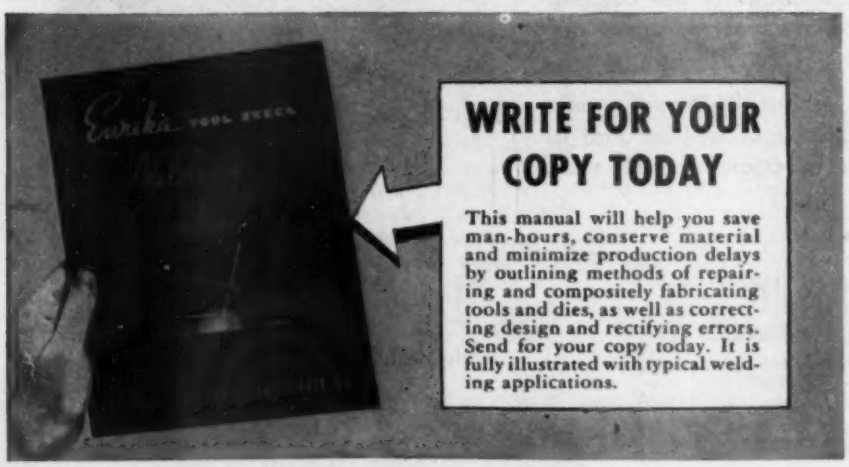
● Design corrected or error rectified using Eureka Tool & Die Welding Electrodes. Weld deposit is roughly finished. You can make change in contours, corners or edges to correct design during die "try-out" or during "change-over" periods.

● Here is how welding rectified mistake in machining a new forging die. Error was corrected by building up with Eureka "Drawalloy" Electrodes, thereby saving $500 in time and material and eliminating unsatisfactory inserts.

Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

223 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN

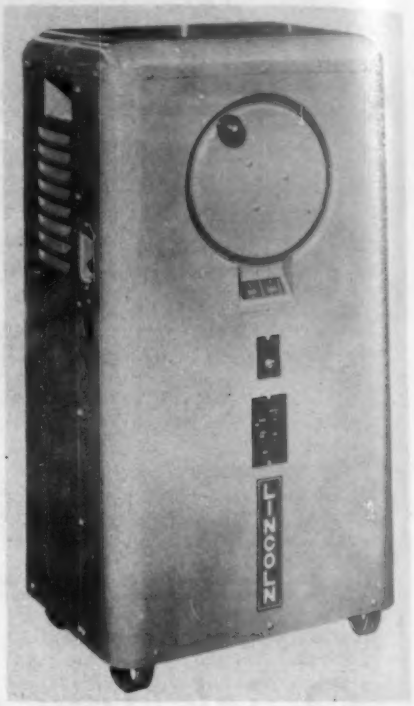


WRITE FOR YOUR COPY TODAY

This manual will help you save man-hours, conserve material and minimize production delays by outlining methods of repairing and compositely fabricating tools and dies, as well as correcting design and rectifying errors. Send for your copy today. It is fully illustrated with typical welding applications.

Welder for Farm Use

★ A low-priced Lincoln welder, the "Fleet-Arc Jr.," has been brought out for operation on 230-volt, single-phase rural power lines. It has a maximum input current of 35 amp and meets the new NEMA standards for this type of welder.



Lincoln "Fleet-Arc Jr." welder. It was specially designed for farms and shops in rural areas.

It also meets the limited input requirements of rural utilities and REA by a design of high efficiency and high power factor, manufacturer states. Weighing 360 lb, the machine is readily portable. It is of rugged construction and has an arc-welded steel frame and housing.

The "Fleet-Arc Jr." can be used with the standard 3-kva transformer provided by the power company. Current range is from 20 amp at 20 volts to 180 amp at 25 volts, which gives sufficient capacity for most types of jobs found on farms or in job welding shops. It will handle electrodes ranging from $\frac{1}{16}$ to $\frac{5}{32}$ in.

A feature of this new welder is its "Arc Booster" to provide quick, easy arc starting as soon as the electrode touches the work. This is done by giving the welding current a boost in intensity and then reverting automatically to the current setting for the job as soon as the arc has been started. No high voltages or special high-frequency devices are used, the output voltage being limited to a maximum of 52 volts. Two degrees of arc boosting may be selected by a snap switch: one for general work and a lower amount for thin material such as automobile fenders.

Current control is of the separate adjustable reactance type; it is varied by turning a handwheel, and the adjustment is continuous over the entire welder range of 20 to 180 amp. There are no taps nor plugs to develop loose connections. The **Lincoln Electric Co.**, Cleveland 1.

AUTHORIZED Meco SALES & SERVICE

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THE Man Who Displays the MECO Trademark is the one with whom you can deal to your best advantage. He is out to serve you . . . he has taken advantage of our factory facilities to provide you with the quickest possible delivery —most up-to-date equipment—and he has the proper maintenance facilities to keep your equipment in service.

The man who displays the Meco sign is sincerely interested in your welfare. Behind him is the Modern Engineering Company—MECO—who have always fostered "Distributor-User" relationships to the advantage of both.

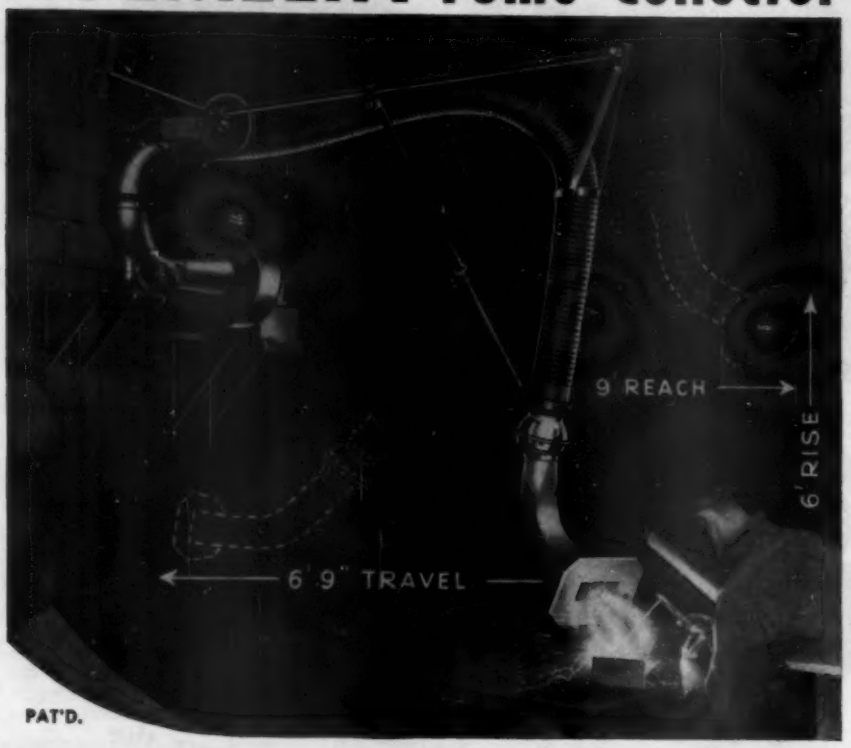
The Super-Weldmaster Torch—Here is the heavy-duty torch for heavy-duty welding of all types . . . much lighter in weight than old-fashioned torches. It includes the exclusive patented MECO Circle Mixer which assures a long, hot flame under every condition . . . equipped with the MECO exclusive Spring Tension Needle-Valve which delivers accurate flame regulation at all times. Ask your Distributor about the Super-Weldmaster.

MODERN ENGINEERING COMPANY

Meco

3413 Pine Boulevard St. Louis 3, Missouri

RUEMELIN Fume Collector



PAT'D.

REMOVES WELDING FUMES

At the Source!

No longer need your employees inhale welding fumes. A Ruemelin Fume Collector solves the problem, quickly and efficiently. It produces a powerful suction that draws out noxious gases, smoke and heat *at the source*. Guards employee health, resulting in less welder fatigue, therefore greater plant output. Has many exclusive features: (1) Clears shop air with minimum loss of building heat. (2) Exhaust snout can be positioned instantly and conveniently. (3) Covers maximum welding territory, vertically, horizontally and by circle swing. (4) Shipped completely assembled, easy to install. Thousands of Ruemelin Fume Collectors now serving war industries. 9 ft. and 15 ft. sizes (radius of swing).

We gladly offer engineering service for your fume collector installation. Write for Bulletin 37-C.

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3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 4709-⅔-R

Shop Containers

★ A handy aluminum container for a wide range of shop uses has just been announced. This product is available in

Many uses around the shop will be found for these handy aluminum containers.

one- and two-qt sizes for such applications as painting on fluxes, etc. It is made of heavy aluminum and is built to stand the abuses of daily shop service. The inside crossbar support serves both as a wiping bar for surplus material and as a hanger for the brush when it is not in use. The cone-shaped top fits snugly over the can, covering both the brush and the contents. **Kindt-Collins Co.**, 12651 Elmwood Ave., Cleveland 11.

» «

Aprons with Snap Straps

★ "StaSafe" fabric aprons are now offered with a new feature, "Snap-Straps," in which web straps and sliding snap fasteners replace thongs, buckles or other outmoded fastening means. The apron can be removed instantly in case it is caught in moving machinery.

These aprons are made in a complete line of styles and sizes in both the bib and waist types. Impregnated and cured with "Stasafe" compound, they protect against acids, caustics, solvents, flame, oils, paints, etc. **Standard Safety Equipment Co.**, 232 W. Ontario St., Chicago 10.

» «

Utility Truck

★ A small, lightweight utility truck for the transportation of cylinders, electrodes and other welding equipment is announced by **Burdett Oxygen.** Truck is small enough to be carried to the job in a delivery car. It is of all-welded tubular construction with a curved handle, 5 in. rubber-tired wheels and oilless bronze wheel bearings. It is 44 in. high, 11½ in. wide, weighs 12 lb and will handle a load of up to 300 lb. **The Burdett Oxygen Co.**, 3302 Lakeside Ave., Cleveland.

"Burdox" portable utility truck. It will handle all shapes of objects and a load of up to 300 lb.

Have You Tried the *New* Norton B-5 Resinoid Wheel?

IF you have, you already know how it really combines in one wheel *both* fast cut and long life.

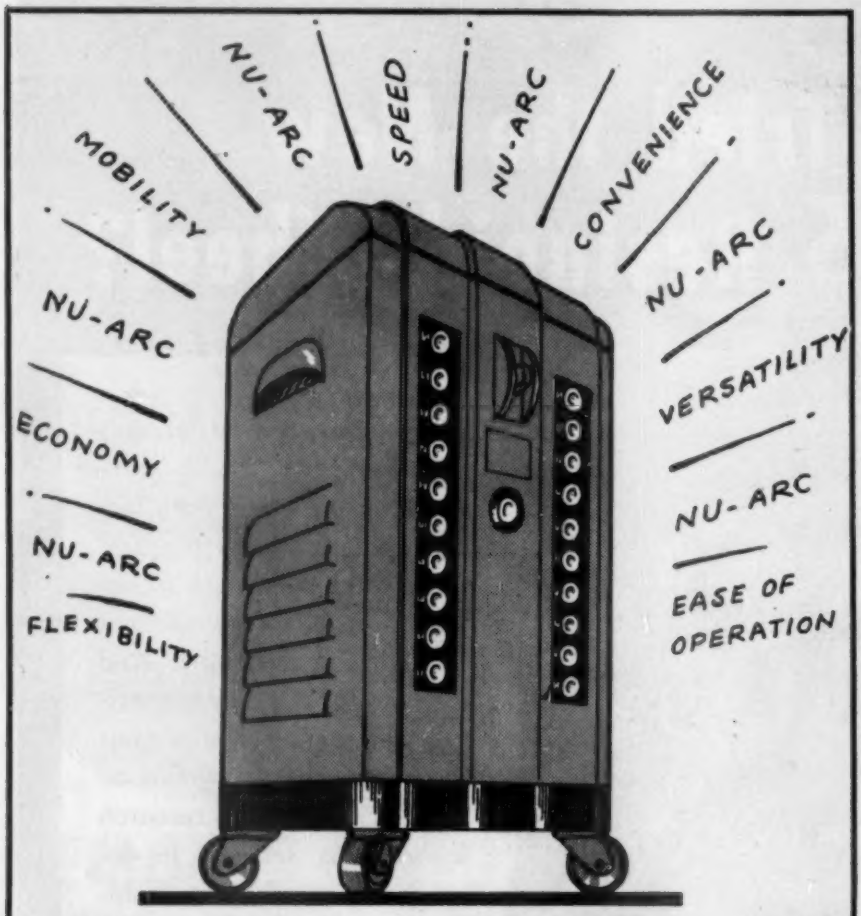
It's always been easy to obtain a wheel that would cut fast but life was short. And it's always been easy to specify a wheel with long life but the cutting action would be slow. The Norton research laboratories set out to develop an entirely new resinoid bond that would really give a wheel with both fast cut and long life. The resulting bond is known as the B-5. How well it is succeeding is attested by reports from countless welding shops. It will really pay you to try the new Norton B-5 Resinoid Wheel.

NORTON COMPANY
WORCESTER 6, MASS.

Distributors in All Principal Cities

W-1036

NORTON ABRASIVES



NU-ARC

A-C WELDING AT ITS BEST!

AN A-C WELDER THAT TAKES LIGHT AND HEAVY WORK IN ITS STRIDE! A STURDY, COMPACT MACHINE TO MEET ALL YOUR WELDING REQUIREMENTS WITH THE TYPE OF PERFORMANCE THAT ONLY A-C WELDING CAN GIVE.

NU-ARC FEATURES

All power is converted into welding current. PAY ONLY FOR THE POWER YOU USE!

NU-ARC is a packaged unit that comes complete with welding accessories, ready to use. Simply connect to power supply — and you're ready to weld.

Easy to use. Desired current range to fit the job is quickly selected by inserting plug-in taps.

Always ready. Mounted on casters for easy mobility. Compact in size, but large in output. Has the stamina needed for production work as well as for job welding in shops, garages and farms.

300 and 400 amp. models have special pipe-thawing attachments.

Five sizes, from 150 to 450 amps. maximum, in standard current range steps. Operates on A-C only, voltages 220-440; 50 or 60 cycles.

Send for illustrated circular and price list.

ELECTRIC ARC, Inc.

152-158 Jelliff Ave. **Newark 8, New Jersey**

Carbon-Electrode Holders

★ A new Tweco line of air-cooled carbon-electrode holders for manual welding includes four sizes: 150, 200, 300 and 500 amp. "Hol-Grip" design, ample length and ventilated handles are features of all models. The carbon is held by a spring-actuated plunger from the handle of the holder. The hexagonal head, exposed conductor tube and plunger are steel. They are of ample capacity to conduct the current to the carbon electrode, yet are of a high-melting point material that has relatively poor thermal conductivity. The cable connection is a simple clamp type, though the Nos. 150-C and 200-C holders are furnished optionally with "Quick-Attach" whip cables and connection lug for short-duration jobs.

Tweco No. 150-C (150 amp) carbon-electrode holder.

The average carbon-arc welding job is done with either the 13½-oz, 150-amp holder (illustrated) or the 20-oz, 200-amp unit. The 150-amp model will handle carbons of from ⅛ through ¼ in. diameters; the 200-amp holder carbons of ⅛ through ⅜ in. diameters. Heavy welding and cutting jobs are done with the 300-amp and 500-amp holders, which weigh 36 and 64 oz respectively. Model 300-C handles carbons of ¼ through ½ in., and model 500-C carbons of ⅜ through ¾ in. diameters. **Tweco Products Co.**, English at Ida, Wichita 7, Kansas.

» «

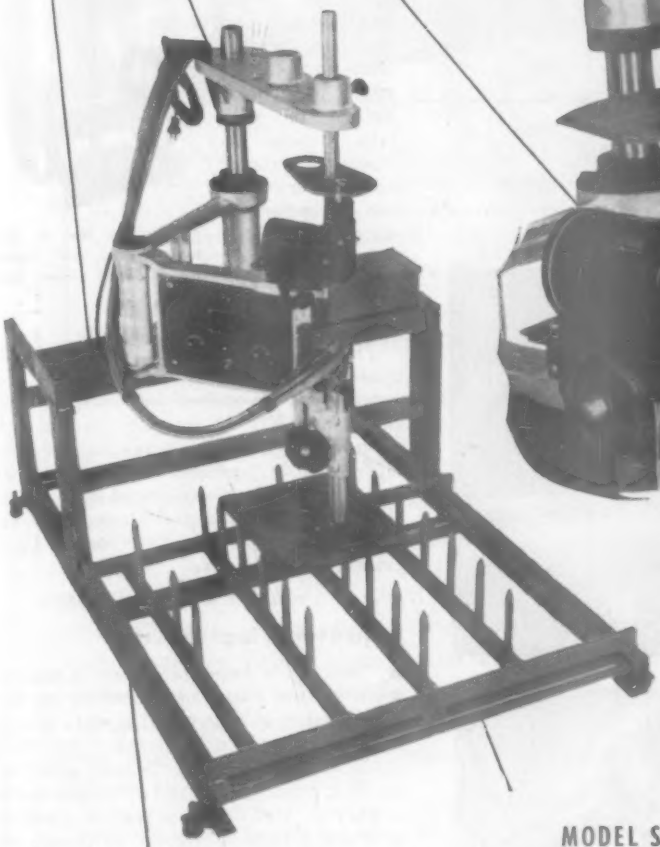
Bench-Model Marking Machine

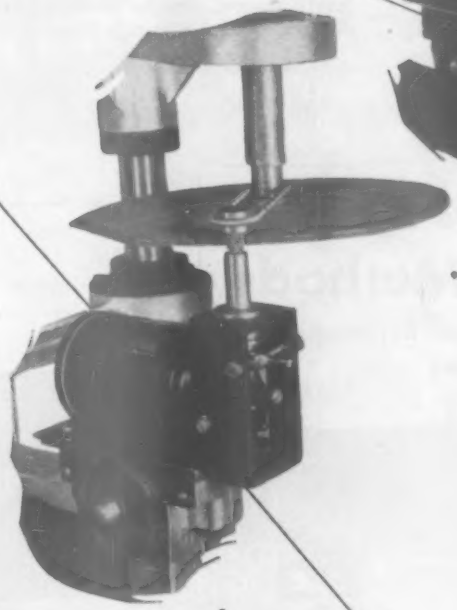
★ Acromark No. 924A hand-operated bench marking machine is said to have a number of advantages and design improvements over the former Model No. 924. Construction has been simplified to give fewer moving parts and adjustments have been provided to compensate for wear of the marking head. An entirely new style of nesting jig allows a greater variety of work to be marked and also simplifies the adjustment for depth of imprint. Jigs to locate individual pieces are easily attached to the machine and can be released by removing the single cap screw which clamps the nest block between machined ways. Practically all types of cylindrical work requiring marking around the periphery and near one edge can be handled with this machine as well as certain types of thin-gauge flat work. **The Acromark Co.**, 5-7 Morrell St., Elizabeth 4, N. J.

BUY VICTORY BONDS

O.M.W.

BETTER SHAPE CUTTING





MAGNETIC TRACING

This tracing device is designed for automatic reproduction from a steel templet. A permanent Alnico magnetic provides the magnetic attraction to hold the driving roller to the templet. No extra or special electrical connections are required. The use of steel templets has been made easy because they may be flame cut by the machine from a simple plywood templet.
The use of a steel templet is recommended when complete automatic operation is required.

SPINDLE TRACING

Spindle tracing, using a *plywood* or some similar material as a templet, is an outstanding feature of this machine. The spindle roller may be held in contact with the templet by the operator or spring tension may be used in many instances, thus making the operation completely automatic.

The templet is fastened to the templet holder by a single bolt. The roller is brought in contact with the templet and the machine then proceeds to cut an accurate reproduction of the shape.

MODEL SC-30
Semi-Stationary Base

DESCRIPTION

Simplicity of templet making and ease of operation makes the O.M.W. the most outstanding shape cutting machine yet developed. It is designed to cut an unlimited variety of shapes, and the machine can be used either as a portable or stationary type. The machine is a unit and as such may be moved easily whether it be on a portable or stationary base.
The cutting range is large—65" lengthwise and 30" laterally. Cutting speed is varied by adjusting rheostats on control panel.

WRITE FOR FURTHER INFORMATION

SPECIFICATIONS

Overall Dimensions	36"x60"
Thickness with Std. Blowpipe	8"
Circle Cutting	0"—30"
Straight Line Cutting	65"
Cutting Speed Range	3"—30"
Electrical Requirements	115V—AC or DC
Net Weight with Semi-Stationary Base	534#
Net Weight with Portable Base	347#

CONTROLS

All controls for operation are centralized on the panel within easy reach of the operator. The speed of the motor is varied by rheostats on the panel. Torch controls are within easy reach all during cutting operation. Offsetting the torch from the line of cut is accomplished by turning the conveniently located handwheel in the direction the offset is desired. This offsetting enables the machine to produce cuts that are unblemished by the piercing operation.

OHMSTEDE MACHINE WORKS

BEAUMONT, TEXAS

Air Ducting

★ A new material, "Airtron," created during the war for aircraft heating and ventilating, is now available for other uses such as the removal of welding fumes. Made of glass cloth impregnated with rubber, it provides high insulation qualities, light weight and flexibility. The latter characteristic renders its use desirable where vibration is present, for it will operate indefinitely under conditions where metal ducting would develop fatigue cracks, states manufacturer. It withstands temperatures ranging from minus 60 F to 300 F without change in properties and will stand well over 50 psi internal pressure at all temperatures.

"Airtron" ducting convoluted on one end for an angular installation. This product is fabricated of glass cloth and rubber.

"Airtron" is manufactured in tubes from 1 to 6 in. in diameter and in any length desired, also in specialized shapes as required for unusual installations. It can be adapted to virtually any equipment as a replacement or as an original installation. Dept. B-9, **Arrowhead Rubber Co.**, 2244 E. 37th St., Los Angeles 11.

» «

Cylinder Truck

★ A new unit, "Wheelrite No. 3," has been added to the line of Wheelrite two-wheel cylinder-handling trucks. The new truck is designed for transporting oxygen or acetylene cylinders of any size from stock to the job. Its all-welded framework of angle irons and tubular steel will take plenty of abuse and stand up under the most adverse shop and field conditions, states manufacturer. The two steel wheels are 10½ in. in diameter.

"Wheelrite No. 3" cylinder truck will handle one cylinder of any size.

The two larger trucks, Nos. 1 and 2, possess 18 in. wheels and will carry two largest-size cylinders of oxygen and acetylene (No. 1) or two medium-size cylinders (No. 2). Features include one-piece tubular handles, all-welded angle-iron framework, wide-flanged steel wheels and rigid preformed steel platform. **Weldrite Co. Inc.**, 29-23 40th Road, Long Island City 1, N. Y.

» «

Improved Fingerguard

★ "Steel-Grip Supergard," which may be worn on any finger or thumb or on any combination of finger and thumb, is said to offer improved protection for such operations as buffing, polishing, grinding, sanding, punch press and assembly work, inspection, etc. It has a leather working face and a back of elastic webbing. **Industrial Gloves Co.**, Danville, Ill.

"Steel-Grip Supergard" No. 15249.

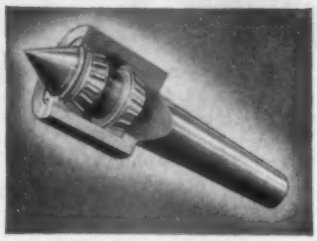
New Precision Built Roto Center Eliminates Chatter... Speeds Production!

Now You Can replace dead centers on lathe and grinder tailstocks, with this new Keene live Roto Center—to increase production—to eliminate all radial play and possibility of chatter! Low in cost, the Roto Center is a high capacity unit, featuring many innovations to speed and improve quality of work!

Matched roller bearings preloaded, are packed with high grade anti-friction grease at assembly. No attention is required for long periods. After assembly, runout is kept to absolute minimum—guaranteed less than .0002. Rear of center is tapped to receive standard hydraulic fitting. Chips, dust and cutting oil cannot reach bearings!

More and more peacetime "helps on the job" are returning to industry. One of these days, famous, flavorful Wrigley's Spearmint Gum will also be back to help you "on the job"—but only when we can assure Wrigley's Spearmint manufacture in *quantity* and *quality* for all. Today, we ask you to remember the famous Wrigley's Spearmint wrapper. Tomorrow, you may again enjoy Wrigley's Spearmint Gum quality and flavor while you are at work.

You can get complete information from Keene Electrical Machinery Co., 549 W. Washington Blvd. Chicago 6, Ill.



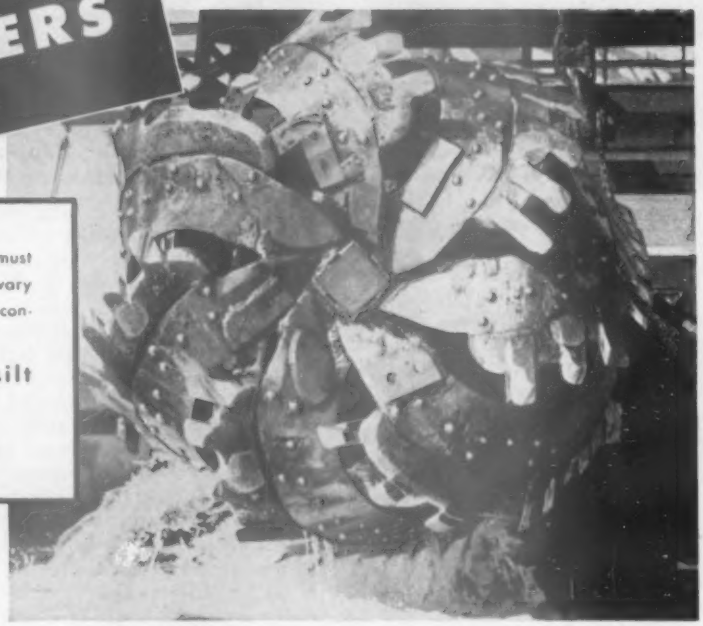
The Keene Roto Center

Remember this wrapper

Z-94

THIS MONTH'S WEAR PROBLEM:

DREDGE CUTTERS



Selecting the proper hard facing alloy for any job must always be based upon operating conditions which vary infinitely between applications. Here are operating conditions imposed upon DREDGE CUTTERS:

SEVERE EROSION of water and silt against cutters.

IMPACT AGAINST submerged debris.

EFFICIENCY of all cutting edges rapidly deteriorates as wear destroys sharpness. Dredge cutters are no exception. Erosion of silt in water, which moves past cutters at high velocity, plus continued collision with gravel and submerged debris, greatly limits useful life of cutters and causes considerable downtime for cutter changes. Furthermore, as cutting edges become dull, their thickness increases with additional loss of digging efficiency.

To increase wear resistance, teeth and blades are now protected with Tube Borium. Not only is 300 to 400 per cent longer dredge cutter life obtained, but cutting edges are *self-sharpening*. Deposits of Tube Borium may be reapplied as required.

Of all hard-facing alloy types, Tube Borium is *first* in wear resistance. Graded particles of tungsten carbide, the hardest and longest wearing of all man-made metals, are encased in mild steel tubes. When applied, the molten tubing forms a solid matrix surrounding each carbide particle and produces an almost abrasion-proof surface. 3/16" Tube Borium is available for either electric arc or oxy-acetylene application. Priced at $3.15 per lb., f.o.b. Whittier, Calif., or distributors' warehouses.

APPLICATION **Electric Tube Borium is applied on leading faces of blades and cutter teeth. Dismantling of the cutter head from the dredge is unnecessary. Inspect periodically and re-hard-face as wear occurs.**

STOODY COMPANY

1141 WEST SLAUSON AVE., WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS

Retard Wear **Save Repair**

News of the Industry

Tool Engineers' Exposition at Cleveland, April 8 to 12

The American Society of Tool Engineers will hold its fifth exposition in Cleveland, April 8 to 12, at the Cleveland public auditorium. It is planned to use the entire quarter of a million square feet of floor space for this event, the first major postwar show featuring machine tools, materials handling and control equipment, cutting tools and production processes.

"It is high time that the added 'know-how' which was acquired during the war years be studied and re-interpreted in the light of peacetime requirements," said C. V. Briner, the Society's president, in announcing the show. "That is the job which we hope to accomplish with the exhibition in Cleveland."

The annual meeting of the American Society of Tool Engineers will be held in conjunction with the exposition, which is expected to be attended by more than 100,000 visitors. A series of technical sessions will also be scheduled.

The show is being designed with major attention to its educational and informative value for all engaged in the field of production. Aside from machines and tools, it is planned to include all types of materials for fabrication, materials-handling equipment, drafting room supplies and tools, machines and devices for determining costs of production and job evaluation, coolants and lubricants, gauges, control devices of pneumatic, hydraulic, electrical and electronic design, and many other tools and devices necessary to turn raw materials into finished products.

» «

Navy Honors C. E. Jackson

Clarence E. Jackson, metallurgist in charge of welding research at the naval research laboratory, Anacostia, D. C., was awarded the Distinguished Civilian Service Award for "outstanding and original researches on the fundamentals of welding metallurgy and for the development of ingenious new tests for evaluating weldability which have contributed to the development of new weldable high-tensile and alloy steel for naval use."

The citation, read by Rear Admiral H. G. Bowen, chief of the office of research and inventions, said in part:

"A continued organized effort has been directed toward the development of a test for evaluating the weldability of steels both of structural and armor grades for naval service. This work has been paralleled by fundamental studies on the metallurgical effects of the welding process. The results of his efforts have been such as to firmly establish Mr. Jackson's work as authoritative in American as well as British welding circles."

Jackson, whose home is at 6607 Poplar Ave., Takoma Park, Md., formerly served as a metallurgist for the National Bureau of Standards, Department of Commerce, and for the naval gun factory at Washington, D. C.

» «

Electronic "Torch" Projects High-Frequency Heating Waves

An electronic "blow torch" which may revolutionize high-frequency heating methods for industry was revealed recently at the research laboratories of Westinghouse Electric Corp. As yet, this new means of hurling invisible ultra-short radar waves at an object to be heated is still in the research stage and not available commercially. Some of its advantages were explained to a group of newspaper and wire service correspondents by Dr. J. A. Hutcheson, associate director of the research laboratories.

"This device," said Dr. Hutcheson, "projects electronic waves on the material to be heated wherever it may be, whereas previous devices required that the object be placed in an electrical field created between two stationary metal plates or electrodes. The advantages of this unit are obvious since it can be used in restricted areas and effectively on irregularly shaped pieces of material. Formerly when a non-symmetrical piece was placed between electrodes, the areas nearest the electrodes were in danger of being scorched or burned before the entire piece was uniformly heated."

The wartime accomplishment of "bringing horsepower to microwaves" makes this new development possible, according to Dr. Hutcheson. "Before the war," he said, "we were able to use a few watts at most in the microwave section of the spectrum; today we work with kilowatts. When greater power output at high frequencies is realized, we may be able to project these radio waves effectively from a tube no bigger than a flashlight."

Dr. J. A. Hutcheson, associate director of Westinghouse research laboratories, demonstrates an experimental model of a device that projects radar-frequency waves for dielectric heating. The liquid plastic in the dish he is holding will be solidified in three minutes. The new method does not require the object being heated to be placed between electrodes.

20,000,000-Volt X-rays Produced by Betatron

The first industrial application of one of the newest electronic devices—the 20,000,000-volt betatron—was disclosed last month in joint releases by the University of Illinois and Allis-Chalmers Manufacturing Co. Generating X-rays more powerful than any ever used in commercial radiography, the betatron enables engineers to take pictures through 15 inches of solid steel in order to detect minute hidden defects in its structure. Despite the high voltage of the X-rays, the betatron can be handled as easily as low-voltage X-ray equipment.

In effect, the betatron is not unlike a cyclotron except that electrons rather than positively charged particles are accelerated. Dr. D. W. Kerst, physicist at the University of Illinois, successfully solved the problem that had baffled scientists for many years—to generate and guide a sufficiently intense beam of electrons in a circular path while they are traveling in a vacuum at speeds approaching that of light. Accelerated to enormous velocities, the electrons quickly reach a speed approximating that of light and continue to gather energy as they spin about in an intense magnetic field. At the proper time, the spinning stream of electrons is diverted to strike a metal target, thus producing the high-intensity X-rays.

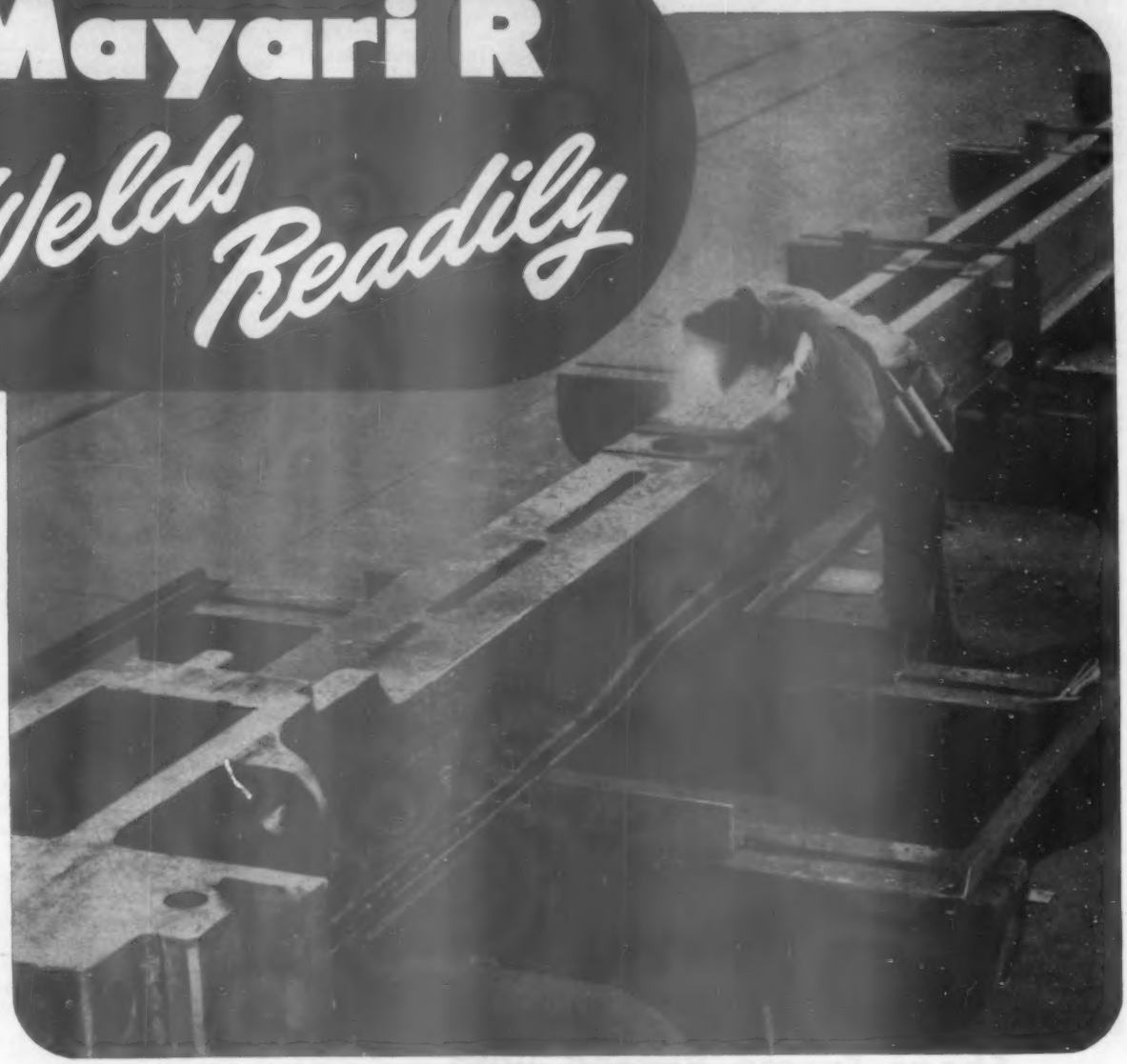
Following the success of Kerst's early laboratory machine, Allis-Chalmers was asked to build an industrial model for the U. S. Government, and a successful unit was put into service in an Army ordnance plant in the fall of 1944. Since then, other betatrons have been installed for the Government to take X-ray photographs through thicknesses of steel unpenetrable a few years ago.

» «

Black Mfg. Co. Joins Welding Supply Ass'n.

Black Mfg. Co., Baltimore manufacturer of oxy-acetylene cutting apparatus and spray guns, has become an associate member of the National Welding Supply Association. Formation of the new national association was announced last month in THE WELDING ENGINEER (page 80). Its headquarters are at 324 East Second St., Dayton 2, O.

Mayari R *Welds Readily*



Mayari R—Bethlehem's low-alloy, high-strength steel—welds as easily as plain carbon steel, by all the standard methods.

Mayari R has no appreciable tendency to air-harden, hence doesn't need heat-treatment. Shear tests on electric-resistance Mayari R welds show substantially higher results than on comparable mild-steel welds.

Mayari R with its extra strength saves weight . . . resists atmospheric corrosion . . . forms readily . . . shows its superiority in hundreds of applications. Look into Mayari R—send for illustrated catalog. Address Bethlehem Steel Company, Bethlehem, Pa.

★ BETHLEHEM STEEL ★

Mayari R *makes it lighter... stronger... longer lasting*

Railroads will Spend Big Money, Says Early

The railroads of this country have current assets in excess of liabilities by more than 1¾ billion dollars and can be counted upon to combat the competitive challenge of the air and bus lines through heavy purchases of new and modern passenger equipment, Stephen Early, former White House secretary, declared recently to the San Francisco Advertising Club.

Appearing before an overflow luncheon meeting in his new capacity of vice-president of Pullman Incorporated, Early said: "In the future, more than ever, the railroads will spare nothing to consolidate their position. Add the big reserve in current railroad assets, which is available for car purchases, to that which will be set aside for such purposes from normal net operating income, and it will be obvious what can be expected in the next few years."

New Distributors

Mir-O-Col Alloy Co., Los Angeles: S & S Auto Parts Co., 410 E. Superior St., Duluth, Minn.; E. Keeler Co., Williamsport, Pa.; Eight Incorporated Metal Sales Div., Salt Lake City, Utah.

» «

Moorewood Electric & Mfg. Co., Los Angeles: Mir-O-Col Alloy Co., Los Angeles, exclusive national distributor for the "Mor-Weld" electrode holder.

When and When Not to Use Respiratory Protection

Respirators provide valuable aid in protecting workers from the vapors of organic solvents. However, according to the Safety Research Institute, Inc., New York City, they should not be used as a general substitute for good ventilation, nor should workers, even with respirators, be exposed to highly contaminated atmospheres because of the danger of skin difficulties and of fires with certain types of solvents.

Respirators are especially useful for: (1) small solvent operations such as some types of spot cleaning where mechanical ventilation is not practicable; (2) occasional operations such as tank cleaning involving large amounts of solvent vapors and (3) additional protection where mechanical ventilation is provided.

Where the vapor concentration is not above 2%, a gas mask which filters out the contaminant chemically may be used, advises the Safety Research Institute. This type of respirator consists of a mask connected by means of a short length of tubing to a canister strapped on the chest or back. The canister contains a chemical which removes the solvent vapor from the air as it is inhaled. Some gas masks are equipped with a chemical cartridge rather than a canister; these, however, have short life spans and can be used only for slightly contaminated air.

Filtering is inadequate protection if the air is deficient in oxygen or contains a high vapor concentration; under such conditions an independent source of air must be provided. This is done with a "supplied-air" respirator, which furnishes uncontaminated air to the wearer by means of a long, flexible hose. If the hose is longer than 25 ft, the air must be blown in by means of a manually operated blower.

A source of compressed air may also be used to feed air to the wearer of the respirator, which in this case is equipped with a narrow-diameter, high-pressure tube instead of the hose and becomes known as the "air-line" type. Since air cannot be breathed naturally through the small hose, air-line respirators should not be used where the atmosphere is so toxic that it would be dangerous to remove the mask for a few minutes in case of failure of the compressed air. Under such circumstances, the supplied-air respirator with large-diameter hose or a self-contained oxygen breathing apparatus must be used.

All respirators should be of types approved for the specific conditions of use by the U. S. Bureau of Mines, and masks should be carefully adjusted and tested for leaks before operations begin. It is generally preferable, Safety Research emphasizes, to put one man in charge of all respirators and have them turned in to him at the end of the day for cleaning, inspection, storage and redistribution.

» «

American Chain & Cable Buys Gauge Manufacturer

American Chain & Cable Co., Inc., Bridgeport, Conn., has acquired the business of the Certified Gauge and Instrument Corp., Long Island City, N. Y. The principal product of the latter concern is a pressure gauge with a patented mechanism called the "Helicoid" movement. This gauge was developed during the war and used widely by both the Army and Navy. Its manufacture will continue at the Long Island City plant under the name Helicoid Div., American Chain & Cable Co., Inc.

Shear Frame Brazed with BRIDGEPORT BRONZE

Still in perfect condition after six years of service is this mill shear shaft frame brazed with Bridgeport Bronze. The break had occurred at the bearing on the end of the frame. A previous weld, by another method, failed and was replaced by brazing with Bridgeport Bronze, which involved surprisingly little time and labor.

No dismantling of equipment or elaborate preheating and slow cooling were necessary. Brazing requires only local preheating to a dull or cherry red. In most cases the brazed joint is stronger than the base metal itself.

Bridgeport Bronze Welding Rods are noted for their smooth flow, good tinning action and machinability. They provide strong, dense, tough welds in new work and repair, on large and small machinery parts. Write for a copy of our booklet, "Bronze Welding Alloys."

"Bridgeport" BRIDGEPORT BRASS COMPANY
BRIDGEPORT 2, CONN. • Established 1865

Bronze Welding Rod A PRODUCT OF
BRIDGEPORT BRASS

HOME for them!

and the HOME STRETCH for YOU!

You still have time! In December, your employees' allotments to the Victory Loan through your company's Payroll Savings Plan offer a final chance to help speed the proud homecoming of our fighting men—and do all in medical power for our hospitalized heroes!

Make December a plantwide TOP-THE-QUOTA drive! Now's the time to spotlight your Payroll Savings Plan—and "brief" your Bond-selling organization for fast, last minute action!

Resolicit every employee to buy the New F.D.R. Memorial $200 Bond

The new Franklin Delano Roosevelt $200 Bond—better than actual cash because it earns interest—is a strong building stone toward the secure future of every employee-purchaser!

From now 'til the New Year—with plant rallies, interdepartmental contests and resolicitation—keep Payroll Savings Plan Bond-buying at a new Victory Loan high! Buying a Victory Bond is the best way of saying "Welcome Home" to our returning veterans! Also an active aid in assuring prosperity to your nation, your employees—and your own industry!

VICTORY LOAN

The Treasury Department acknowledges with appreciation the publication of this message by

THE WELDING ENGINEER

G-E Reconversion Program: More Goods at Lower Prices

The goal of the General Electric Company in the reconversion era is "more goods for more people at less cost," the stockholders were told recently in a statement accompanying their third quarter dividend. As evidence of progress in this direction, it was pointed out that at the Appliance and Merchandise department, Bridgeport, a rocket launcher production line was converted to washing machine production in a period of ten weeks.

Standardization as well as full production will lower the cost of products in the future, the report said. Instead of 60 models of fans, for example, G-E will build 21; five types of irons instead of 19 and one kind of mixer instead of three.

» «

Alabama Concern Sponsors Marine Engineering Research

A research project including all phases of design and improvements of marine equipment is being sponsored by the Waterman Steamship Corp., Mobile, Ala. The program will be undertaken by the engineering research division of the Southern Research Institute, Birmingham, and will be under the direction of E. N. Kemler, head of the division, and G. B. Clark of the Waterman research laboratory.

Develop 9%-Nickel Tubing for Sub-Zero Temperatures

Application of the recently developed 9%-nickel steel to tubing designed especially for sub-zero temperatures was announced last month at The Babcock and Wilcox Tube Co., Beaver Falls, Pa. The new high-nickel steel has not hitherto been available in tubular form.

Developed primarily to answer the pressure tubing needs of plants handling liquefied gases or other low-temperature fluids, the new tubing is said to exhibit good physical properties at temperatures as low as minus 320 F. It may be applied in low-temperature work as a substitute for 18-8 stainless steel, and it will have particular applications in oil refineries and the chemical industry. Other uses predicted by H. D. Newell, chief metallurgist and director of the tube company's laboratory, are for special pump tubing in oil wells where salt water and hydrogen sulphide in the oil fluid present a difficult corrosion problem, for black liquor evaporation in the Kraft paper industry, for caustic solution evaporation and for alkaline-phenol solution work.

» «

Linde Air Prod. Expands Southeastern Facilities

Construction is under way or completed of new oxygen and acetylene distributing facilities in Mobile, Ala., and Miami, Fla., for The Linde Air Products Co., a unit of Union Carbide and Carbon Corp. Another unit, Carbide and Carbon Chemicals Corp., has announced plans for the erection of a "Pyrofax" gas-filling station at the Miami site.

The Evans Construction Co., Mobile, was awarded the contract for constructing the oxygen filling station and acetylene-producing plant in the Alabama city. This plant was expected to be in operation about Dec. 1. At Miami the construction contract was awarded to John B. Orr, Inc. The new facilities in the Florida city include an oxygen-distributing plant, an acetylene-producing plant, a warehouse and a bulk filling station for "Pyrofax," a fuel gas supplied for gas-burning home appliances and for case-hardening steel and other metallurgical operations.

» «

Layman Welding Supply Opens at Grand Rapids

R. Dudley Layman, former district manager and welding engineer of the Grand Rapids, Mich., office of The Lincoln Electric Co., has opened a new welding supply house to serve users and prospective users of welding supplies in the western Michigan area. The new concern, located at 215 Oakes St., S. W., Grand Rapids, carries a complete stock of arc and gas welding and cutting materials.

Layman, who left Lincoln Electric after 19 years of service to go into business for himself, has been replaced at the Grand Rapids office by I. R. Bartter, previously district manager of the Lincoln branch at Duluth, Minn.

Here is the unbeatable combination for fast, good looking, dependable, low cost and profitable fabrication and repair.

MARQUETTE
REGISTERED U.S. PAT. OFFICE

WELD-ALL ELECTRODE KIT

This handy kit contains a generous supply of 12 types of rod in various sizes. It is designed to make all welding jobs easier. Enables you to weld all types of metal and build your reputation on dependable welding. Handy chart on cover flap identifies each rod and lists the jobs for which it is especially designed. The Marquette Weld-All Kit will help you make Extra profits.

"The Key to Better Welding"

MARQUETTE
REGISTERED U.S. PAT. OFFICE

A.C. ARC WELDERS

Marquette A.C. Arc Welders are designed to take all welding jobs in stride from light sheet metal to heavy steel structures. The exclusive A.C. feature of "Balanced Polarity" gives Thorough Penetration and Metal Control with a Single rod . . . and completely eliminates the problem of troublesome "Magnetic Blow." All Marquette Welders are completely equipped with no extras to buy.

These features make versatile Marquette Welders ideal for high speed production, maintenance and repair. Marquette Distributors are always ready to serve you.

MARQUETTE MFG. CO., INC.
Minneapolis 14, Minnesota

MARQUETTE
REGISTERED U.S. PAT. OFFICE

Welding EQUIPMENT
ELECTRODES And SUPPLIES

MAXIMUM POSITIONING + FAST HAND OPERATION = MORE PROFIT

ANY WORK up to 500 lbs. in weight can be quickly flipped into position at the touch of a hand through 360° of rotation and 135° of tilt on the Bentley *BALANCED* Positioner. A fast universal tool for repair and production welding, grinding, shot blasting, painting, drilling, overhauling and assembly work.

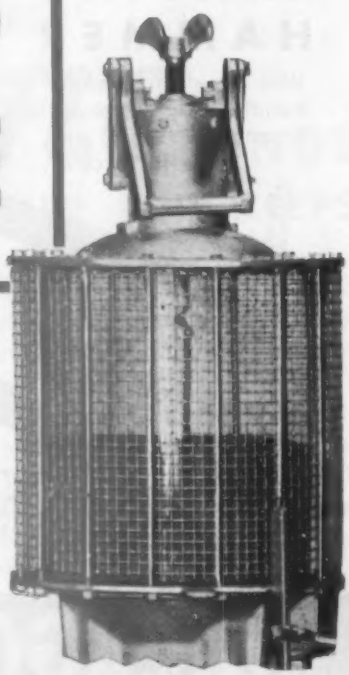
No power cost. Long structures easily handled, since tilting spindle is *below* face plate. Better welds at lower cost by down hand welding in all positions.

Model No. 5 capacity 500 lbs. with center of gravity 6" to 12" above face plate, which is 30" in diameter. Notice ample foot room allowed by movable base. Pedestal may be set in floor or wall bracket. Model No. 1½, 150 lb. capacity. Bentley *BALANCED* Positioners quickly pay for themselves with better work at lower cost.

Write for the full story of Balanced Positioning

BENTLEY WELDERY, INC. Box 1038, Dept. C-8, Syracuse, N. Y.

Sight Feed is more than a TRADE NAME



● It's true that "Sight Feed" is the name of one of the finest acetylene generators on today's market. But "Sight Feed" is also descriptive of an outstanding feature of this generator: the completely transparent Pyrex hopper which holds the carbide.

A glance at this hopper before you start a welding job will instantly tell you how much acetylene you may expect from your latest "charge." No guesswork—no "running out of heat" in the middle of a job—and the feed is entirely automatic.

"Sight Feed" acetylene is purer, hotter—yet it costs only a *fraction* of what you pay for "bottled" acetylene. Can you afford *not* to buy a "Sight Feed"?

Contact your jobber, or...

THE SIGHT FEED GENERATOR COMPANY • RICHMOND, INDIANA

All-Purpose "Rototillers" May Make Plows Obsolete

The Farm Equipment Div. of Graham-Paige Motors Corp. plans to produce a minimum of 50,000 "Rototillers" during the first full year of operation at Willow Run. The Rototiller is a Swiss invention which crumbles the soil with rapidly revolving steel tines. A line of attachments now under preparation will enable it to serve also as a lawn and field mower, furrower, cultivator, planter, snow plow and portable power plant to operate circular saws and other farm machinery.

"We believe mass production of this all-purpose farm implement will make the plow obsolete for certain types of work," prophesied Graham-Paige President Joseph W. Frazer. "More than a thousand inquiries and orders for Rototillers are being received each day."

» «

Kinner Motors Becomes Gladden Products Corp.

Stockholders of Kinner Motors, Inc., Glendale, Calif., voted recently to change the corporation's name to Gladden Products Corp. in honor of John N. Gladden, president. The company now has four correlated manufacturing and sales activities, latest of which is the foundry division added when the Kinney Iron Works was acquired. The iron works will supply Gladden Products Corp. with castings for its other divisions; aircraft engines, industrial engines and hydraulic controls.

» «

Westinghouse Opens Western High-Frequency Laboratory

A laboratory for study of the problems encountered by western industry in making use of high-frequency heating, either induction or dielectric, has been opened in Los Angeles by the Westinghouse Electric Corp. Dr. Russell A. Nielsen, formerly of the company's research laboratories at East Pittsburgh is in charge, assisted by a staff of engineers.

Applications of induction heating are growing rapidly, according to Dr. Nielsen. Among uses he lists as established or possible are: the surface hardening of gears, shafts, tools and cylinders; production brazing of parts; soldering of cans, bushings, etc.; heating for forgings; melting of high-quality metal alloys; annealing of metal tubing and sheet; heat treating of pipe welds, etc.

Dielectric heating is being used or is technically possible in such tasks as the softening of plastic preforms and other materials prior to molding, the bonding of plywoods, plastics and shatterproof glass, the curing of rubber and plastics, treating of rayon and nylon, drying of food, etc.

» «

Anderson Hits Foes of Patent System

Smaller manufacturers would be damaged first and most by adoption of antipatent legislation, John W. Anderson, president of the National Patent Council, Gary, Ind., asserted in a new publication, *Competitor*. Mr. Anderson called attention to pending bills by Senator Kilgore (D., West Va.), Representative Bailey (D., West Va.) and Representative Voorhis (D., Calif.). These bills, he said, advocate "government domination of research and development, unwarranted increases of justice department intervention in patent matters and generally bear toward and provide for compulsory licensing."

Secretary of Commerce Henry A. Wallace and newly appointed Patent Commissioner Casper W. Ooms were named by Mr. Anderson as among those favoring compulsory licensing of inventions.

» «

Pullman-Standard Plans Cafeteria Dining Cars

Plans for a self-service, high-capacity dining car capable of serving two to three times as many passengers per day as conventional diners were recently disclosed by the Pullman-Standard Car Mfg. Co., Chicago. Seating 56 as compared with 36 to 48 in conventional diners, the new "cafeteria car" makes use of a diagonal seating principle which gives each passenger a side of the table for himself.

This is the third innovation in dining-car accommodations to be originated by Pullman-Standard. The first, a luxurious club-like diner, introduced diagonal seating. The second was a grillroom car, which also featured self service.

SAVE TIME USE A
CMD
WELDERS CHIPPING HAMMER
With steel or wooden handle. Light weight. Strong. Easy to use. Write for circular.
TYPES EB and FB
Models E and F can be supplied with brush as shown here. Brush can be replaced by unscrewing countersunk screw in bracket and removing.
TYPE F
Head has two chisels at right angles.
TYPE E
Head has drift and chisel.
TYPE A
Has drift and chisel. Widely used in malleable and grey iron foundries for general chipping.
TYPE CB
Combines 3 tools in 1—drift, chisel and removable wire brush.
TYPE C
Same as Type CB, but without brush.
CHICAGO MANUFACTURING AND DISTRIBUTING COMPANY
1928 WEST 46th ST., DEPT. W., CHICAGO 9, ILLINOIS

For Greater Safety ★ Superior Welding

USE G-E WELDING ACCESSORIES

VENTILATED HELMET

(Cat. No. 87X578) Equipped with a crown sheet for skull protection, this helmet features screened ventilators which provide cool comfort and prevent fogging of the glass. Included also are eye-protective lens, lens gasket, clear cover glass, adjustable chin rest, head gear, snap-on sweatband.

(List Price $6.50)

TREATED COVER GLASS

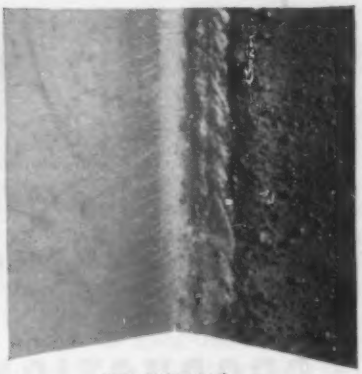
(Cat. No. 98X349) Coated on both sides with a tough, transparent, moistureproof compound this cover glass helps to maintain clear vision and is highly resistant to weld-spatter. Efficiency of coating gives this glass many times the life of an untreated glass.

(List Price $0.10)

FILLET-WELD GAGE

(Cat. No. 92X512) A necessary tool for both operators and inspectors, this handy fillet-weld gage provides a quick, accurate means of gaging fillets which have a straight, concave, or convex contour of the following sizes: ¼ in., 5/16 in., 3/8 in., 7/16 in., ½ in. and 5/8 in.

(List Price $1.25)



G-E GLYPTAL*

No. 1294—Weld-spatter Preventive Coating. A single coating of No. 1294 prevents adhesion of weld-spatter for either singlepass or multipass welds. Especially suitable when fabricating stainless or special alloy steels.

(List Price per gal. $1.80)

**Trade-mark Reg. U.S. Pat. Off.*

OTHER G-E WELDING ACCESSORIES

Gloves • Lenses
Goggles • Slag brushes
Cable connectors
Electrode holders
Leather clothing

General Electric Company
Schenectady 5, N. Y.

BUY WAR BONDS

GENERAL ELECTRIC

672-62-8748

EASY-FLO RINGS

"WED" METALS TOGETHER FOR KEEPS

It's the fashion today to join metals with preplaced rings of EASY-FLO silver brazing alloy wire—first, because low-temperature EASY-FLO means fast, reliable, low-cost brazing—second, because preplacing the alloy speeds production, gives accurate control of amount of alloy and assures uniform distribution throughout a joint—and finally, because metals joined by EASY-FLO will never be parted by vibration, shock or extremes of temperature. They're one for keeps. START NOW to get the benefit of EASY-FLO's speed, reliability and economy in your metal joining operations present and future. **BULLETIN 12-A** tells you how. Write for your copy today.

EASY-FLO fabricated Air Speed Indicator Part. 6 joints in upper assembly brazed simultaneously—then 10 in lower. EASY-FLO rings preplaced at all joints.

STEEL SALES CORPORATION

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DISTRICT OFFICES
3348 S. Pulaski Road Chicago, Illinois Milwaukee Minneapolis

A welding electrode specially designed for PRODUCTION WELDING!

AGILE Grey WELDING ELECTRODES

Production and sheet metal welding has long felt the need for a welding rod that *will not burn through* and that will have good fluidity. In short it must be a "cold" rod that will not warp the work piece.

Agile Grey Electrode is the answer because it has a coating which embodies Endothermic heat absorbing reaction making it the "coolest" rod on the market. It also has excellent fluidity. This electrode is a "natural" for sheet metal welding. Write for full particulars.

AGILE ACTARC

AMERICAN AGILE CORPORATION
5806 HOUGH AVENUE
CLEVELAND 3, OHIO

ABOUT PEOPLE

H. F. Kneen has been named vice-president in charge of manufacturing and **G. G. Landis** vice-president in charge of engineering for The Lincoln Electric Co., Cleveland. Mr. Kneen was formerly general plant superintendent and Mr. Landis chief engineer.

» «

George O. Boomer, formerly vice-president of Tube Turns, Inc., Louisville, has been elected president. He succeeds **Rudy E. Fritsch,** who resigned as president but will remain with Tube Turns as a consultant, for the present.

» «

Hendley Blackmon, formerly manager of editorial service for Westinghouse Electric Corporation, has joined the McGraw-Hill Publishing Co. as electrical editor of *Product Engineering.* Pending the return of **Lt. Carl Nagle,** now on duty in the Pacific with the U. S. Navy, **H. C. McDaniel** will act as supervisor of editorial service and be responsible for the company's technical and trade magazine activities.

» «

L. D. T. Berg, for the past five years a sales engineer in General Electric's electric welding division, Schenectady, has been appointed welding specialist of the company's Atlantic district, with headquarters in Philadelphia.

» «

L. W. Hutchins, president of the advertising agency Sheldon, Morse, Hutchins and Easton, Inc., and managing director of Safety Research Institute, and **Lee Graves,** formerly of Compton Advertising, Inc., and Foote, Cone and Belding, have formed a new advertising agency under the name of Hutchins and Graves, Inc., with offices at 420 Lexington Ave., New York City.

» «

Warner R. Over, formerly secretary and assistant treasurer, will now serve as secretary-treasurer of the Pennsylvania Salt Mfg. Co., Philadelphia. L. A. Smith, who served as vice-president and treasurer, has retired.

» «

Dr. William T. Griffiths, chairman of The Mond Nickel Co., Ltd., London, has been elected a vice-president and director of The International Nickel Co. of Canada, Ltd., to succeed the late David Owen Evans. Dr. Griffiths is president of the Institute of Metals of Great Britain.

» «

Mrs. Fanny Bauer Scheinfeld has been placed in charge of advertising of the glove and garment division of Colonial Tanning Co., Inc., Milwaukee.

John D. Gordon, formerly general sales manager, has been advanced to general manager of the Progressive Welder Co., Detroit. **Carl L. Halpin** leaves his consultation practice on manufacturing to take over the production management of Progressive's expanded line of resistance-welding equipment.

» «

Earl F. Noyes, formerly with Sperry Gyroscope Co., has been appointed sales manager of Arrowhead Rubber Co., Los Angeles.

» «

Chester A. Snell, for the past three years with Aluminum Company of America, has joined the staff of Foster D. Snell, Inc., consulting chemists and engineers, Brooklyn.

» «

Everett S. Lee and **James W. Parker** have been re-elected chairman and vice-chairman, respectively of the Engineers' Council for Professional Development. Mr. Lee is an engineer with the General Electric Company's general engineering and consulting laboratory, and Mr. Parker is president and general manager of The Detroit Edison Co. Other officers of the Engineers' Council are William N. Carey, secretary, and H. H. Henline, assistant secretary.

» «

Dr. Charles H. Herty, Jr., assistant to the vice-president of Bethlehem Steel Co., was elected national president of the American Society for Metals at the recent annual meeting in Cleveland. Other officers elected were: **A. L. Boegehold,** head of the metallurgy department, research laboratories div., General Motors Corp., Detroit, vice-president; **Dr. H. K. Work,** manager of research and development, Jones & McLaughlin Steel Corp., Pittsburgh, treasurer; **John Chipman,** professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., and **W. E. Jominy,** chief metallurgist, Dodge Chicago plant, Chrysler Corp., trustees.

» «

Dr. Stephen F. Urban, after 9½ years with the Carnegie-Illinois Steel Company's research laboratories in South Chicago, has been made director of research of the Titanium Alloy Mfg. Co., Niagara Falls, N. Y. He is in charge of all divisions—metallurgical, ceramic and chemical. **Dr. Eugene Wainer,** formerly in charge of the company's chemical and ceramic research divisions, has been made associate director of research with authority in all three divisions. **William Baldwin** has been made chief of the ceramic division.

» «

Marcus M. Chapman, after two years with the steel division of the War Production Board, has been appointed manager of sales, sheet division, of the Carnegie-Illinois Steel Corporation. He succeeds **Howard V. Clark,** resigned.

Now ***Welders*** can Spend their time ***Welding***

Without C-F Positioners, much of the time consumed in the fabrication of large weldments is *handling time*, time spent lifting, flopping, and propping up weldments into position for each new pass. Added to each hour of actual welding time is the cost of crane time, sling crews, and above all, continuous interruptions and delay. How different where C-F Positioners rotate great weldments under push button control. Here welders can spend their time welding —welding all sides and all angles as they should be welded "down hand."

There are C-F Positioners in capacities from 1200 lbs. to 30,000 lbs. Manual or motor driven. Write for Bulletin WP-22.

C-F
Positioners

CULLEN-FRIESTEDT CO.

1309 S. KILBOURN AVE. CHICAGO 23, ILL.

What

DOES IT COST YOU TO HANDLE CYLINDERS?

• Every pair of cylinders that "run-out" in your shop increases your overhead—because the time needed to get full cylinders . . . to switch regulators . . . and to make pressure and flame adjustments is *not* productive.

You can eliminate all excessive cylinder handling costs with a RegO manifold . . . and get other advantages too! Write for full details now.

REGO — ARMY E NAVY

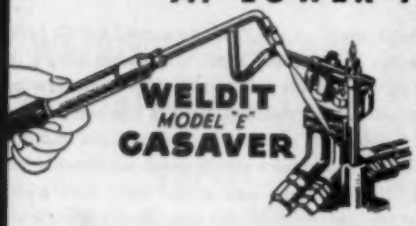
The BASTIAN-BLESSING Company

4239 Paterson Ave. Chicago 30, Ill.

Pioneers and Leaders in Equipment for Using and Controlling High Pressure Gases

Safe Welding

AT LOWER PRODUCTION COSTS



The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

WELDIT INC.
628 BAGLEY AVENUE • DETROIT 26, MICH.

Off the Floor Deliveries!

ON
TRINDL *SUPER INDUSTRIAL ARC WELDER*

DESIGNED FOR HIGH SPEED PRODUCTION ARC WELDING

TRINDL SUPER INDUSTRIAL ARC WELDERS, the result of many years of careful engineering and "job tested" research, are rolling up impressive production records. Acclaimed for superior performance, ruggedness, dependability, and economical operation.

For better, faster welding, easy-to-operate **TRINDL SUPER INDUSTRIAL ARC WELDERS** will help step up your production schedules 20% to 40%. Manufactured in a range of distinctive sizes to accommodate every type of shop and production welding job.

Trindl Welders, Electrodes, supplies and accessories, available for immediate delivery, will save you both time and money. Write, wire or phone for full details.

TRINDL PRODUCTS, LTD. 17 EAST 23rd STREET AR
CHICAGO 16, ILL.

Charles Schenck, engineer of development, Bethlehem Steel Co., has retired after an association with Bethlehem dating from 1918. He was one of the pioneers in the art of electric welding of steel and is nationally known for his contributions in this field. He was also interested in the important field of repair welding.

» «

W. Harrison Lackey has been appointed sales representative in York, Pa., and vicinity for Lukens Steel Co. and subsidiaries, Coatesville, Pa. He has recently been engaged in general sales work for By-Products Steel Corp., a Lukens subsidiary, and previous to that was on the "Manhattan District Project" assisting in the development of the atomic bomb.

» «

Dr. John M. Parks, of Rensselaer Polytechnic Institute, has joined the staff of the American Society for Metals as editor of technical books. He will also assist in the work of the Society's educational committee and will prepare lecture series for use by the 69 local chapter groups. Under the war research program of the Rensselaer metallurgy department, Dr. Parks prepared studies on the seam welding of steel to aluminum, spot welding of hardenable steels, etc. He has also served as a consultant for various industries concerned with metal spraying, welding failures and X-ray diffraction and radiographic examination.

» «

Dr. H. Shaeffer has been appointed Cleveland district manager of the Vanadium Corp. of America. He will make his headquarters in the Union Commerce Building with the Cleveland-Cliffs Iron Co.

» «

Stephen B. Metcalfe has been named special engineer in charge of rope plant development of the American Steel & Wire Co., Cleveland. **A. J. King** has been appointed general superintendent of the New Haven and Trenton Works and will center his activities at New Haven. **Charles R. Chase** has been made superintendent of the Trenton Works, succeeding Mr. King.

» «

G. V. Woody, manager of the Allis-Chalmers district office at Pittsburgh since 1934, has been named manager of the company's basic industries department, Milwaukee. He succeeds **R. C. Newhouse,** who retires after more than 40 years as an engineer, inventor and designer.

» «

Donald J. Reese, head of the iron and non-ferrous castings section of the development and research division of the International Nickel Co., Inc., New York City, was recently presented with a "Tribute of Appreciation" from the Gray Iron Founders' Society, national association of manufacturers of engineering gray irons.

HERCO VARIABLE CORE ARC WELDERS

MODELS FROM 150 TO 1500 AMPERES WITH OR WITHOUT POWER FACTOR CORRECTION

for:

24 hour per day operation.
Exact heat control.
Increased production.
Lower power costs.
X-ray test welding.
Ease of operation.

Inquire about MAGNETIC CLAMPS for quick positioning and alignment.

HERCULES ELECTRIC & MFG. CO. INC.

MANUFACTURERS OF THE PRECISION WELDER WITH THE STREAMLINED ARC

2500 ATLANTIC AVENUE • BROOKLYN, N. Y.

IT SAVES MONEY!

Protect-O-Metal cuts clean up time 90%. That's real money saving, any way you look at it. The spatter and compound wipe off easily, eliminating costly grinding. It also prevents annealing scale. The best reason for you to use Protect-O-Metal is to save money.

IT IMPROVES WELDING

Nuts, brother! No matter what you say about the cash, I use POM because I get a better weld. It stabilizes the arc and licks arc blow. The flux in it helps fusion . . . and it doesn't cause any SMOKE, SMELL, or FUMES. That's for me everytime.

Right! PROTECT-O-METAL

ARC WELDING COMPOUND

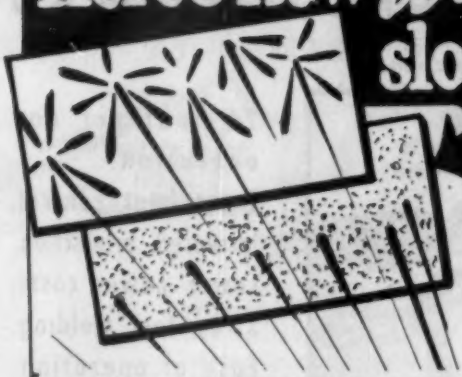
DOES BOTH!

PROVE IT YOURSELF

SEND FOR FREE SAMPLE!

G. W. SMITH & SON
109 S. Sperling, Dayton 3, Ohio
Gentlemen:
Send us a free sample with instructions. We'll test your claims ourselves.
Name _____ City _____
Street _____ State _____

Here's how *Welding* is slowed down



THERMACOTE COVER LENSES *Eliminate this*

WELD SLAG BOUNCES OFF

THERMACOTE special transparent plastic coating is impervious to weld spatter. No time lost changing glasses. Constantly clear vision insures better welding with more footage.

SLAG STICKS TO GLASS

As weld slag accumulates on cover glasses vision is reduced, production decreased and time lost with frequent changing of glasses.

THERMACOTE CO.

NEWARK CHICAGO
LOS ANGELES PORTLAND

Arctrol

CUTS your welding COSTS

If you hope to survive in post-war competition that lies ahead, your production costs must be pared to a minimum. War production calls for speed. Peace-time production demands low cost. "ARCTROL" gives you both!

Whether you are still engaged in meeting war contract requirements or are planning on reconversion, "ARCTROL" can help you to speed up production . . . and cut costs as well.

"ARCTROL" regulates generator output from full-rated current down to snuffing it out completely . . . merely by moving the foot pedal. Easily installed with all makes of welders.

Ask your Welding Supply Jobber or write for Data Sheets and Prices.
Specify welding equipment you use.

MULLENBACH ELECTRICAL MFG. COMPANY

2300 E. 27TH ST. LOS ANGELES 11 CALIFORNIA

John C. Patterson, director of the patents and industrial research department of the National Association of Manufacturers since 1939, has been appointed executive vice-president of National Patent Council, Gary, Ind., a new organization of smaller manufacturers launching a nation-wide program in defense of the U. S. patent system. **James L. Straight** has been appointed western division executive director. Since Pearl Harbor, Mr. Straight has been in charge of committee coördination for the Aircraft War Production Council, central agency for production and technical collaboration among major aircraft manufacturers in the west.

» «

James B. Rosser has been elected vice president in charge of Eastern sales of railroad equipment of the Pullman-Standard Car Mfg. Co. He will make his headquarters in New York City. Mr. Rosser, was formerly administrative assistant to the company's president, C. A. Liddle.

» «

Charles A. Reinbolt, Jr., has joined the American Central Mfg. Corp., Connersville, Ind., as sales promotion manager. Mr. Reinbolt, formerly with the Jam Handy Organization in Detroit, will be particulary concerned with the new line of "American Kitchen" steel sinks and cabinets shortly to go into production.

» «

G. N. Emmanuel, formerly associated with the Murray Co., Boston, has joined the metallurgical staff of The Babcock & Wilcox Tube Co., Beaver Falls, Pa., as research metallurgist.

» «

Frank St. Vincent, formerly with the operating department of the Vanadium Corp. at Niagara Falls,. has been appointed sales engineer of the Pittsburgh district.

» «

Gordon W. Monfort, formerly western division advertising representative and later personnel director of the Caterpillar Tractor Co., Peoria, Ill., has been made director of the company's news bureau.

Died . . .

Frank H. Carpenter, one time vice-chairman of the Chicago section of the American Welding Society and a well-known individual in the welding industry in both Chicago and Los Angeles, was killed October 31. He was hit by an automobile while changing a tire which had been deflated by a Halloween prankster.

» «

Frank C. Angle, manager of the general machinery division field sales offices, Allis-Chalmers Mfg. Co., died on October 25 after an illness of several months. He was 45 years old and had been with Allis-Chalmers since 1929.

The Makers of

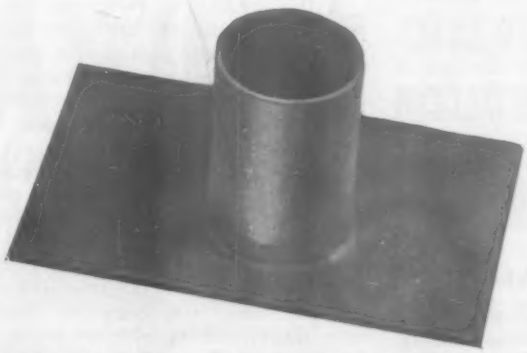
NATIONAL

WELDING CONTROLS

Extend You All

A Merry Christmas And A Happy New Year

AMID *PEACE* AGAIN AMONG NATIONS



BRAZING ALUMINUM MEANS LOWER COSTS

KRE-CO ALUMINUM BRAZING PROCESS reduces costs to a minimum, speeds production and joins parts perfectly, even with thin gauge aluminum. New operator training time halved —that's how simple the process is. Bulletin D 5 should be in your file send for it now.

KRE-CO MULTICHEMIC FLUX
DIVISION OF
CHARLES W. KRIEG CO.
52-60 Dickerson St. Newark 4, N.J.

WELDING SUPPLIES?

Call us FOR QUICK SERVICE!

UNITED STATES STEEL SUPPLY COMPANY — USS STEELS — SERVICE

LARGE STOCKS and the convenient location of our nine warehouses in the nation's leading industrial centers are two reasons why we can offer quick service on welding supplies.

For electric arc welding we have a large supply of the following:

STAINLESS STEEL ELECTRODES

MILD CARBON STEEL ELECTRODES

WE offer quick service, too, on Welding Machines, Protect-O-Metal for the elimination of weld spatter, and Havens Protected "C" Clamps. Just phone, write or wire our warehouse nearest you. Your orders and inquiries will receive prompt, courteous attention.

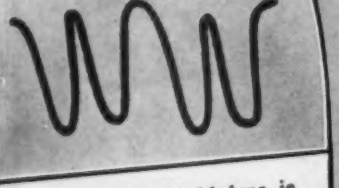
EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air.* American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

UNITED STATES STEEL SUPPLY COMPANY

CHICAGO (90) · BALTIMORE (3) · BOSTON (Allston 34)
CLEVELAND (14) · MILWAUKEE (1) · NEWARK (1), N. J.
PITTSBURGH (12) · ST. LOUIS (3) · TWIN CITY-*St. Paul* (4)

UNITED STATES STEEL

Get This Assurance of Welding Eye Protection



Every Willson-Weld lens is marked like this. Purpose: to show that it meets highest Federal specifications. Reduces intensity of visible light, filters out harmful ultra-violet and infra-red rays.

Clear cover lenses to protect green Willson-Weld lenses from pitting. Both lenses easily replaceable. Welding goggles fit comfortably over ordinary correction spectacles.

Style CW-60

Shade number — determined by individual photometer test —indicates density and thickness of each lens. Simplifies selection. Lenses easily interchanged for different types of welding.

For help with your welding eye-protection problems, consult your Willson distributor or write for further information.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON PRODUCTS INCORPORATED

Established 1870

227 WASHINGTON STREET • READING, PA., U.S.A.

Helpful Literature Just Published

The following reviews are of recent publications of interest to those in the welding industry. Unless otherwise stated, they may be obtained without cost by writing to the manufacturers listed.

Welding-Code Catalog

A four-page, 4 by 9 in. catalog, price list and order blank of AWS codes, standards and specifications has just been published. AWS committee reports, special articles and bulletins are also listed as are general welding books, publications of the International Acetylene Association and ASME, API and ASA codes pertinent to welding. **American Welding Society,** 33 West 39th St., New York City 18.

» «

Flame-Cutting Booklet

A revised edition of Airco's "New and Improved Oxy-acetylene Methods for Steel Foundries" is now being distributed. This 32-page, letterhead-size booklet demonstrates the advantages of machine flame-cutting in the removal of risers, gates and sprues. It also describes three other fast and economical oxy-acetylene applications: flame-scarfing to remove the padding left after risers have been removed, flame-gouging for the removal of webs, fins and defects, flame-descaling of normalized and annealed castings. Other sections are devoted to the uses of the oxygen lance and to flame-hardening for localized surface hardening of castings. A catalog of the oxy-acetylene apparatus and supplies necessary for these processes is also included. **Air Reduction Sales Co.,** 60 East 42nd St., New York City 17.

» «

Railroad Welding Booklet

The use of arc welding in the fabrication of new structures and railroad rolling stock is discussed extensively in an eight-page letterhead-size bulletin, GEA-4298, "Electric Arc Welding for Railroads." This booklet includes a table of typical savings to be effected by reclaiming various locomotive parts by welding, photographic reproductions of various railroad applications and a catalog of electrodes and welding equipment suitable for railroad work. **General Electric Co.,** Schenectady 5.

» «

"Phos-Trode" Bulletin

Bulletin W-7 (four pages, letterhead size) has been issued by Ampco Metal to describe "Phos-Trode," a new shielded-arc, phosphor-bronze electrode (see page 73, November, THE WELDING ENGINEER). The bulletin is well illustrated with views of typical welds and tests, and it contains weld-deposit physical properties, recommended amperage, welding procedure and a list of typical applications. **Ampco Metal, Inc.,** 1745 S. Thirty-Eighth St., Milwaukee 4.

» «

Cutting-Electrode Bulletin

A four-page, letterhead-size bulletin on "Ellpro" cutting electrodes gives details and specifications of these arc-oxygen electrodes for underwater or surface cutting as well as an illustrated description of the "Palmgren" arc-oxygen kit containing the necessary tools and equipment. These electrodes can be used with any portable welding set by simply adding a tank of oxygen. Underwater cutting can be done with them at depths of up to 280 ft, and for surface work they have been found efficient for cast iron and other hard-to-cut materials. **Ellwood Products Corp.,** Ellwood City Pa.

» «

Electrode Wall Chart

A 16½ by 21½ in. reference chart for service men and mechanics to hang in the shop concisely summarizes the properties and characteristics of each of five types of "Tournaweld" electrodes. The first three types are hard-facing or high-tensile electrodes designed to meet special problems in the repair and maintenance of construction, logging, mining equipment and other heavy machinery. The other two are standard mild-steel electrodes operating on either a-c or d-c. The chart lists with each type its built-in characteristics and purpose, available sizes, distinguishing color and proper current for most efficient operation. Sketches illustrate typical applications. To obtain this chart, ask for Form "WT-111." **R. G. LeTourneau, Inc.,** Peoria, Ill.

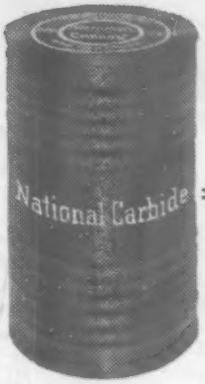
» «

Welding-Gun Bulletin

Bulletin 122-A (eight pages, letterhead size) covers the Sciaky "OWH" series of hydraulically operated gun spot welders. These are portable suspension units, utilizing a hydro-pneumatic booster to provide pressure and manufactured in both alligator (scissors-type) and C-type guns. The bulletin includes two pages of sketches to show how these welding guns can be adapted by means of various jaw and yoke designs and by means of different positions of suspension and handle placement to any portable welding problem. **Sciaky Brothers,** 4915 West 67th St., Chicago 38.

National
Carbide

• EFFICIENT
ECONOMICAL
DEPENDABLE •



For
Welding and Cutting
Specify

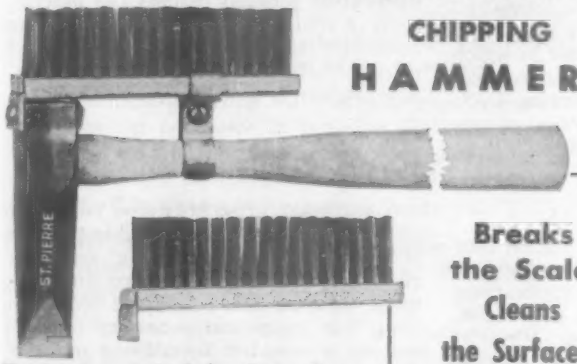
NATIONAL CARBIDE IN THE RED DRUM

Write us for information as to nearest available stock.

NATIONAL CARBIDE CORPORATION
60 E. 42nd St., New York 17, N. Y.

ABUSE MEANS NOTHING TO ST. PIERRE

CHIPPING HAMMERS



Here's a man-sized brush in the right position for easy use after chipping scale from welded surface. Hammer-Chisel made of highest quality tool steel. Entire tool is well-balanced. For economy, for durability use ST. PIERRE Hammers.

Breaks the Scale Cleans the Surface in One Operation

Order Today From Your Jobber or Direct

ST. PIERRE Chain Corporation
WORCESTER DROP FORGINGS MASSACHUSETTS

"Standard" Welding Positioner rotating heavy machine part for continuous downweld.

"STANDARD" WELDING POSITIONER

Go home full of pep after a big day's work . . . welding is a lot easier using a "Standard" Welding Positioner. You can downweld continuously at faster speeds and don't have to chase the work or keep moving it into position for welding. The "Standard" Welding Positioner has a built-in variable speed transmission and hydraulic cylinder which give full power control with a single ½ H.P. motor. Linear speeds from 1" to 180" per minute are easy to set and regulate. The table can be quickly power tilted by a lever to any angle from 0° to 135° from level, and table height is adjustable from 30" to 36" from the floor, positioning all work up to 700 lbs. exactly where you want it.

Write for Catalog

STANDARD MACHINERY COMPANY
1473 Elmwood Ave. Providence 1, R. I.

Sold his season's quota in two weeks. His manufacturer uses

COLONIAL
GLOVE AND GARMENT SPLITS

It would make our line easier to sell. Colonial produces large spread whole kips and side splits in Pearl and Fawn. Send for samples.

COLONIAL TANNING CO.
Glove and Garment Leather Division
MILWAUKEE, WIS.

W-AL-CO
COVER LENSES

for Gas Welding.
Spatter-resisting or plain.

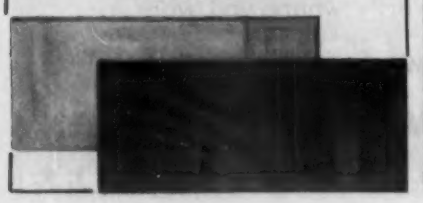
GOGGLE LENSES (50 mm)

Protect Your Vision with the Best in Lenses and Plates

WELDING ALLOYS MFG. CO.
744 Broad St., Newark 2, N. J.

W-AL-CO

SUPER-PLATE FILTER LENSES for Helmets and Handshields.



"Norbide" Abrasive Data

Beautifully printed in natural colors, a four-page, letterhead-size circular tells the story of "Norbide" (boron carbide), the hardest abrasive manufactured synthetically. Norbide is used for machine lapping of cemented-carbide wire-drawing dies, for lapping flat cemented-carbide tools and as a substitute for expensive diamond dust in other lapping operations. It can be molded (at high temperatures and under great pressure) into shapes for such products as gauges, blasting nozzles, dies, etc. **Norton Co.**, Worcester 6, Mass.

» «

Fibre Products Catalog

Handles and guards for electrode holders, bushings and washers for other welding applications are included among the vulcanized fibre products pictured in the four-page, letterhead-size catalog of **Wilmington Fibre Specialty Co.**, Wilmington, Del. Wilmington Fibre is used for parts that require high insulating properties and also economical production. Similar materials known as "Ohmoid" and "Fyberoid" are also described in the catalog.

» «

Apprentice-Training Booklet

In reply to thousands of inquiries from men in service for information on apprenticeship, a comprehensive booklet has been prepared by Apprentice-Training Service, U. S. Department of Labor. This booklet, "Apprentice Training for Returning Servicemen" (16 pages, 3½ by 8 in.) was written in collaboration with representatives of the educational branches of the War and Navy Departments and the Veterans Administration. Among other information, it explains the financial benefits which supplement veterans' apprentice wages, the qualifications required of veterans for these benefits as well as for apprentice training, the procedure to follow, the application forms and experience records needed. A list is also given of over 100 skilled trades in which workers are trained through apprenticeship. **Apprentice-Training Service**, U. S. Department of Labor, 1778 Pennsylvania Ave., N. W., Washington 25.

» «

Stainless-Steel Bulletin

The various types of Jessop stainless steels and their production applications are concisely described in a new eight-page, letterhead-size booklet. Physical properties and mechanical characteristics, corrosion resistance and properties in fabrication are given for each type of stainless steel. Information is also included on Jessop stainless-clad steels (10% and 20% claddings). **Jessop Steel Co.**, Washington, Pa.

» «

Skilsaw Catalog

A 44-page, letterhead-size catalog on portable electric "SkilTools" pictures and describes the different models available of "SkilDrills," "SkilSaws," "SkilSanders," "SkilBlowers," "SkilGrinders," "SkilShear," "SkilNibbler" and the various accessories used with these electric-motor-driven tools. A four-page section on "How to Get the Most from Your Electric Tools" and a page of "Do's and Don'ts" in the care and operation of portable electric tools are also included. **Skilsaw, Inc.**, 5033-43 Elston Avenue, Chicago 30.

» «

Bending-Press Catalog

Cleveland Crane catalog No. 2010-B is an eight-page, letterhead-size booklet, describing "Steelweld" bending presses and "Bulldozers." Details of construction are illustrated photographically and with sketches, and tables of dimensions and specifications are included. Data are also provided on special bed and ram designs.

Each of the presses has a rigid one-piece frame fabricated by welding heavy rolled-steel plate. There are 29 different sizes available for such jobs as bending, forming, drawing and multiple-punching of plate from light gauge to 1 in. thickness and in lengths up to 20 ft. "Steelweld Bulldozers" are extra-powerful presses for the bending and forming of heavy bars and plate, for forging and other work requiring from 80 to 220 tons of bending capacity. **The Cleveland Crane & Engineering Co.**, 1129 E. 283rd St., Wickliffe, O.

» «

Bulletin on A-C Test Sets

General Electric announces a new 24-page bulletin (GEA-4477) containing data and descriptive information on the company's complete line of portable a-c test sets from 2,000 to 150,000 volts. The portable equipments covered include small insulation testers, oil testers and larger general-purpose test sets with ratings as high as 25 kva. In addition, the publication contains listings and descriptions of sphere gaps and current-limiting resistance assemblies for use with a-c testing sets. **General Electric Co.**, Schenectady 5.

» «

Metallizing Circular

A four-page, letterhead-size, two-color circular, Bulletin F-1A, describes the new Mogul Model F metallizing gun and gives information on construction features, spraying speeds and gas consumption. The equipment necessary for setting up a complete metallizing outfit is also pictured. **Metallizing Co. of America**, 1330 W. Congress St., Chicago 7.

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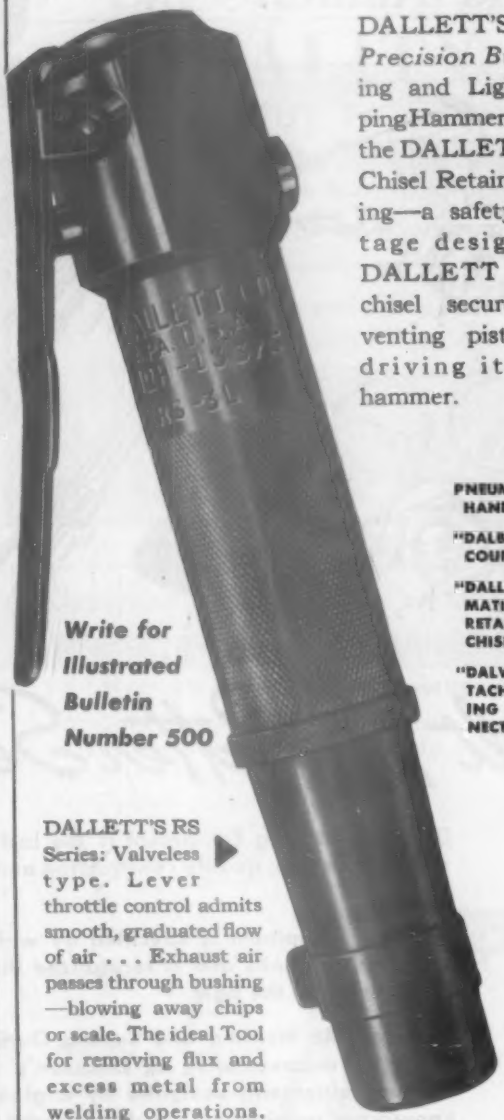

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FROM THE PATENT OFFICE

Spot Welder

2,386,261. **James H. Redmond,** Schenectady, assigned to **General Electric Co.,** Schenectady. Filed Aug. 31, 1944. Issued Oct. 9, 1945.

A spot-welding apparatus comprising a frame, work-engaging electrodes, mechanical means on the frame for moving the electrodes toward and away from one another and for applying welding pressure, and electrical means including the welding circuit through the electrodes for controlling the electrode pressure on the work during the flow of welding current. The latter means includes a lever pivotally supported on the frame with its pressure arm connected to control the pressure applied to the work. Force arm of the lever is located adjacent and lengthwise of another part of the welding circuit, in which it is lengthwise connected through a current-conductive joint having movable parts. The electromagnetic force of repulsion between the other part of the welding circuit and the force arm of the lever moves the latter about its pivotal support in a direction to apply the controlling electrode pressure to the work.

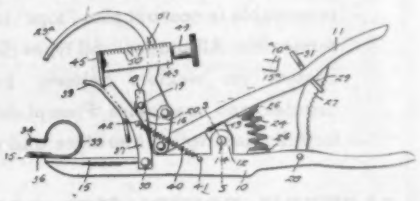
» «

Weldor's Hood

2,386,656. **Stanley H. Carlson,** Seattle, Wash., assigned to **Flex-Weld Corp.,** Washington. Filed May 23, 1944. Issued Oct. 9, 1945.

An attachment for a weldor's hood comprising a housing for attachment to the inner side of the front wall of the hood. The housing includes front and rear walls and opposite side walls. Front and rear walls have aligned window openings. A U-shaped panel carrier, slidable in the housing, carries a dark-glass panel. It is the purpose of the mechanism described in the patent application to normally maintain the carrier in an uppermost operating position with the panel in registry with the openings.

» «



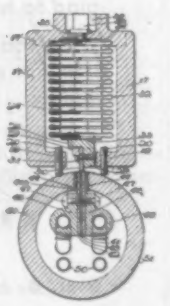
Clamp-Applying Tool

2,386,570. **Samuel Isaac Petrie,** Mount Sidney, Va. Filed Nov. 18, 1943. Issued Oct. 9, 1945.

In a tool for attaching a clamp of straplike circular form with spaced apertured arms for the attachment of holding means. The tool comprises a rigid jaw and a pivoted coöperating jaw. Pivotally connected handles attached to the jaw members are adapted to move the pivoted jaw toward the rigid jaw and into engagement with the adjacent clamp arm for juxtaposing the clamp arms for attachment of the holding means. A means adjustably carried by the pivoted jaw operatively engages with a shoe plate, moving with the latter into engagement with the clamp in order to hold the clamp rigidly supported.

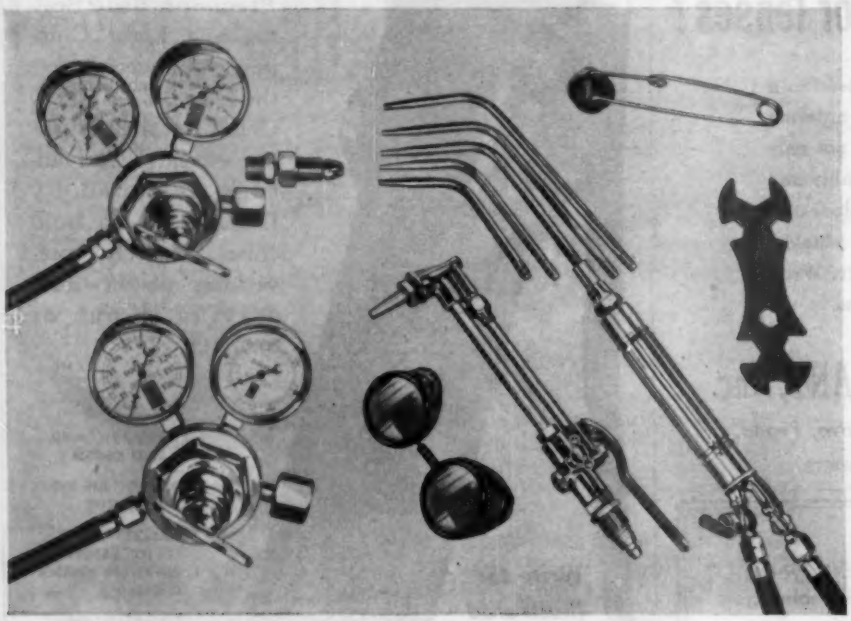
» «

Tube-Mill Electrode



2,385,710. **Henry Kershaw,** Belleville, N. J. Filed May 2, 1944. Issued Sept. 25, 1945.

Electrodes for flash welding tubing. The electrodes are insulated from each other and adapted for connection with a source of welding current. A means separate from the electrodes is used to press the parts toward the electrodes for welding; this means includes a pneumatic cell to cause the pressure to follow through without the loss of time due to inertia.



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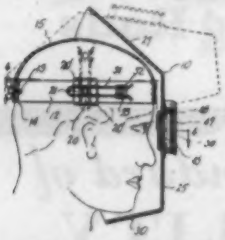
Weldor's Helmet

2,384,765. **Joe O'Reilly,** Tacoma, Wash. Filed June 19, 1943. Issued Sept. 11, 1945.

In a weldor's helmet, a block fixed at a side of the headband and having a substantially flat outer face. A pivot stud extends from the block at a central



location of the face. Two pairs of grooves are formed across the face of the block in right angular relationship to each other, and paired grooves pass on opposite sides of the pivot stud. A side wall of the face shield pivotally receives the pivot stud for raising and lowering movement of the shield. A single piece of spring wire is bent in an elongated U with the ends of the wire rigidly fixed to the side wall of the shield. The looped end portion of the spring clip thus formed receives the stud. The two legs of the loop yieldingly engage against the grooved face of the block and are adapted to seat in the paired grooves to determine the raised and lowered positions of the shield and to yieldingly retain it at either position.

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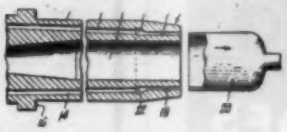

Torch Tip Manufacture

2,383,949. **Peter R. Aronson,** Kenmore, N. Y., assigned to **Union Carbide and Carbon Corp.,** New York City. Filed Nov. 29, 1939. Issued Sept. 4, 1945.

A method of making a unitary torch tip from a single body of ductile metal. A series of gas passages are formed in an annular zone about the longitudinal axis. Next an annular groove of substantial depth is formed within the discharge end of the body; the annular groove is in communication with each gas passage and is of sufficient diameter and thickness to include them all. Into the annular groove is inserted a tubular mandrel of less thickness than the groove. The discharge end of the ductile metal body is then cold worked so as to force the outer wall of the groove into continuous contact with the outer surface of the mandrel. When the thickness of the groove has been reduced to that of the wall of the tubular mandrel, the latter is removed from the groove.

Plastic Welding Control

2,384,014. **George A. Cutter,** Dedham, Mass., assigned to **Thomson-Gibb Electric Welding Co.,** Lynn, Mass. Filed May 3, 1943. Issued Sept. 4, 1945.

An apparatus for welding together two pieces of thermoplastic material. It comprises a pair of clamps for receiving the pieces, a heater, a drive shaft, connections to the shaft including a clutch, means for automatically disengaging the clutch after a predetermined partial revolution of the shaft, and means for engaging the clutch to produce a first partial revolution. The first partial revolution of the shaft closes the clamps on the pieces, inserts the heater between the pieces and moves the clamps so that the pieces are pressed against opposite sides of the heater. A timer then engages the clutch to produce a second partial revolution of the shaft; this does not take place until the portions of the pieces pressed against the heater have become softened. A means operated by the second partial revolution of the shaft moves the clamps to withdraw the softened portions from the heater, removes the heater from between the portions, moves the clamps to press the softened portions of the pieces together to form the weld and finally opens the clamps.

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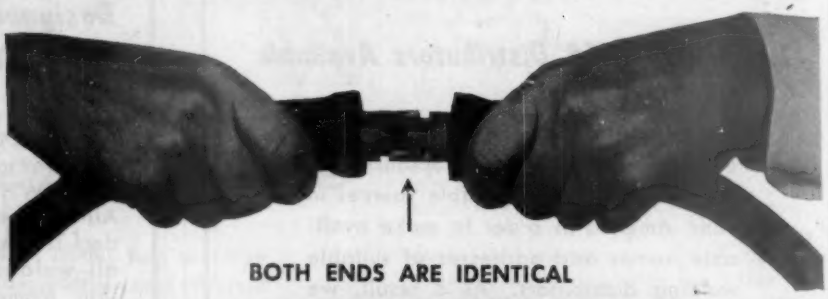

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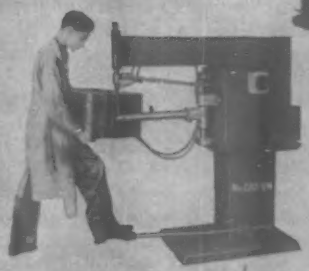

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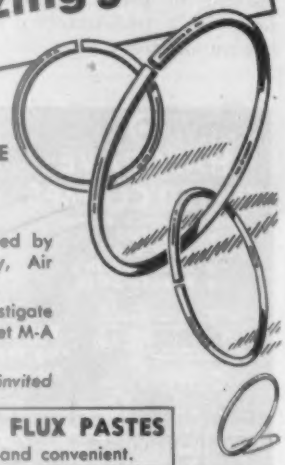

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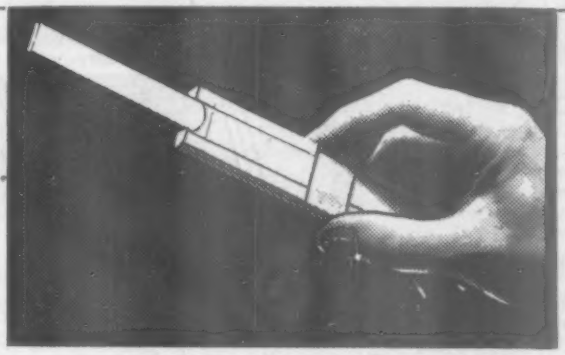

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Stud Gun

2,383,695. **Ralph S. Thacker,** West Los Angeles, assigned to **Leo M. Harvey,** La Canada, Calif. Filed May 28, 1940, and Aug. 24, 1942. Issued Aug. 28, 1945.

A welding device comprising means for forming an electrode for engaging the work, means for continuously applying a steadily increasing pressure on the electrode and means for passing heating current to the electrode. The current flows for a predetermined period of time beginning above the initial pressure and ending below the maximum pressure. There is also a time delay means.

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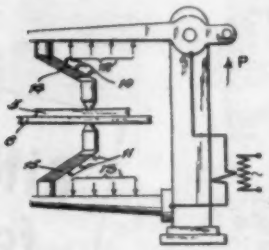

Spot-Welding Method

2,382,711. **Gerhard Hagedorn,** Berlin-Lichterfelde-West, Germany, vested in the **Alien Property Custodian.** Filed Feb. 11, 1941. Issued Aug. 14, 1945.

A spot-welding apparatus having two rigid conducting arms, each electrically connected to an electrode. The electrodes are adapted to engage the workpieces to be welded. A flexible support attached to the arms holds the electrodes and moves them individually into yielding engagement with the work. Each flexible support forms an acute angle with respect to its conducting arm; the result is that the magnetic flux set up by the current flowing in the supports reacts with the flux set up by the current flowing in the arms to increase the pressure of the electrodes upon the workpieces by electromagnetic reaction.

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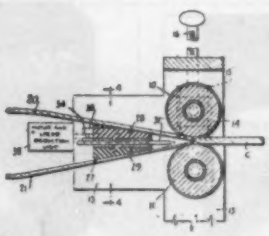

Welder for Bimetal Sheets

2,385,043. **Alfred Vang,** Newark, assigned one-half to **Stevenson, Jordan & Harrison, Inc.,** New York City. Filed April 16, 1943. Issued Sept. 18, 1945.

An apparatus for welding sheets of similar or dissimilar metals, comprising pressure and counterpressure feeding rollers, means for guiding the sheets to and between the rollers so as to be in face contact with each other, and an ignition electrode. The latter is at least as wide as the sheets and is located between them at a line slightly in front of the rollers. The welding current flows between the rollers and electrode. There is also a means for ionizing the atmosphere bounded by the sheets from their line of contact to the electrode in order to control the welding current, which is caused to arc between the adjacent faces of the sheets and electrode. The adjacent skins of the sheets are melted, and the sheets are then forced together by the rollers to complete the weld.

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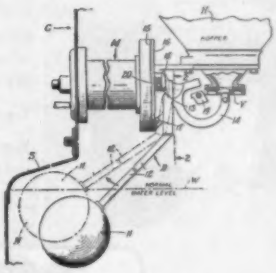


Acetylene Generator

2,385,087. **Jean La Force,** San Mateo, Calif., assigned to **Union Carbide and Carbon Corp.,** New York City. Filed Aug. 23, 1944. Issued Sept. 18, 1945.

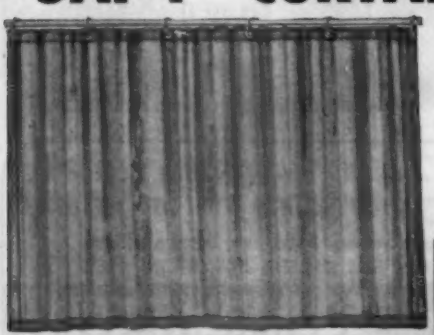
A carbide feed valve for an acetylene generator. A pivoted arm turns to close the valve. A float-controlled device turns the arm and closes the valve when the water in the generator falls to a predetermined low level. The latter device consists of a lever and a float, arranged to operate the arm to close the valve when the float has fallen to the low-water level.

» «

Torch Tip

2,385,107. **Egon B. Scherl,** Niagara Falls, N. Y., assigned to **The Linde Air Products Co.,** New York City. Filed Sept. 9, 1941. Issued Sept. 18, 1945.

A torch tip comprising an extruded orifice bar having formed on it a bottom face. A longitudinal coolant channel has a wall comprising a side wall of the bar adjacent to the bottom face. A longitudinal gas channel is also formed in the bar. A number of gas passages in the side wall are disposed in substantially close relation with each other. The coolant chamber is arranged between the bottom face of the bar and the gas channel and is slightly offset laterally with respect to the gas channel to locate the coolant side wall directly beneath the bottom of the gas channel. The gas passages are disposed between the coolant channel and one side of the bar with their inlet ends opening directly into the gas channel. The coolant channel is thereby in substantially tandem relationship with respect to the gas channel.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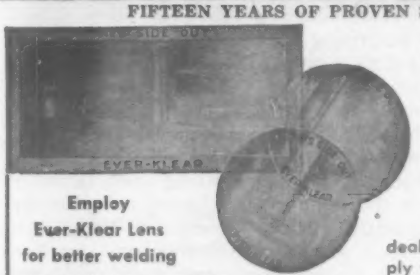

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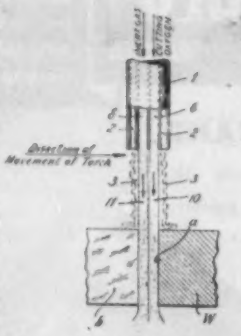


2,384,921. **Howard G. Hughey,** Fanwood, N. J., assigned to **Air Production Co., Inc.,** New York City. Filed Jan. 14, 1944. Issued Sept. 18, 1945.

A cutting torch having a number of fuel-gas passages in the tip terminating in a circular series of discharge orifices. Two adjacent passages in the tip terminate in central discharge orifices, both of which are located within the circle of fuel-gas orifices. One of the central orifices is located immediately to the rear of the other. The forward one of the central orifices is in communication with a source of cutting oxygen, and the rearward one is in communication with a source of inert gas.

» «

Resistance-Welding Circuit

2,384,923. **Edmond J. P. James,** Akron, O., assigned to **Packard Motor Car Co.,** Detroit. Filed July 15, 1942. Issued Sept. 18, 1945.

This patent pertains to a resistance-welding circuit including means to supply welding current to the work and a pair of switches in series. One of the switches is controlled manually and the other switch is normally open. A means responsive to temperature rise in one of the workpieces closes the normally open switch and opens the normally closed switch in the heating circuit.

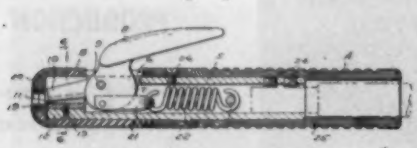
» «

Seam Welder

2,384,924. **Edmond J. P. James,** Canal Fulton, O., assigned to **Packard Motor Car Co., Detroit.** Filed July 15, 1942. Issued Sept. 18, 1945.

This patent pertains to a machine for seam welding telescoped out-of-round workpieces together. The workpiece is fixed on a carrier electrode structure supported for rotation on a constant axis. Uniformly timed welding current is supplied intermittently to the roller electrode, and the carrier is rotated so that the surface speed of the workpiece is uniform.

» «

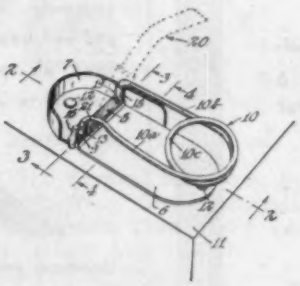


Electrode Holder

2,384,999. **Paul W. Heinrich,** Grosse Pointe Park, Mich. Filed July 5, 1944. Issued Sept. 18, 1945.

This holder comprises an elongated tube, a sleeve of insulation defining a hand grip, a tubular extension on the tube having a slot, a hand lever fulcrumed in the tube extension and projecting through the slot, a jaw carried by the hand lever, a spring for swinging the hand lever and a fixed jaw with diagonal grooves. The tubular extension is provided with a protective shield at the forward end and with a rod-receiving opening extending through the tube and through the protective shield.

» «



Torch Lighter

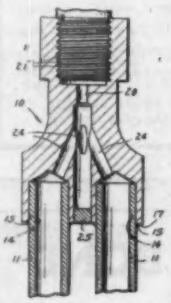
2,384,844. **Oscar V. Malmquist,** Minneapolis. Filed Sept. 3, 1943. Issued Sept. 18, 1945.

A lighter having a substantially flat base, a lighter file extending transversely across the base, a flint-carrying spring and a flint. The flint is carried by the end of one leg of the spring carrier and overlies the file. The other leg of the carrier is formed to provide downwardly, transversely and upwardly extending portions. The transversely extending portion extends under the base directly beneath the file; the downwardly and upwardly extending portions engage opposite edges of the base and exert squeezing pressure on the opposite ends of the file in order to anchor the flint holder and file to the base.

» «

Torch Mixing Head

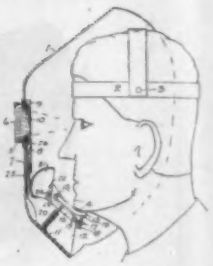
2,384,920. **Howard G. Hughey,** Bloomfield, N. J., assigned to **Air Reduction Co., Inc.,** New York City. Filed March 7, 1941. Issued Sept. 18, 1945.



Torch head including a mixer for oxygen and fuel gas, a header connected to the mixer, a central passage into which gas flows from the mixer and a restricting port at the end of the central passage, close to the mixer. There is an abrupt change in cross-section from the restricting port to the portion of the passage on the downstream side of the port, causing turbulence and more thorough mixing of the oxygen and fuel gas as they flow through the central passage. Flexible copper tubes are secured in a circle of recesses in the end face of the header remote from the mixer. One end of each tube fits and is secured into one of the recesses, while there is a jet orifice at the other end. Branch conduits in the header connect each tube with the central passage; the branch conduits diverge from the central passage at equiangular points around its circumference, and each has a cross-section substantially equal to the cross-section of the jet orifice at the end of each tube. The restricting port in the central passage has a cross-section of the order of 85% of the sum of the cross-sections of the jet orifices. The central passage terminates in a dead end that forms a pocket for increasing the turbulence of the gas mixture.

» «

Weldor's Hood



2,384,798. **Otto J. Olson Conway,** Tacoma, Wash. Filed May 31, 1943. Issued Sept. 18, 1945.

This patent includes a lever pivotally mounted in a weldor's hood and adapted to be energized by the movement of the chin-rest, a metal tape and a swingable quadrant. The movement of the chin-rest will cause the lever to rock the quadrant and wind the tape to move the eyeshield out of the line of sight. A spring engages the lever to hold the eyeshield in its normal position.

» «

R-W Electrode Holder

2,385,108. **Melvin M. Seeloff,** Warren, O., assigned to **The Taylor-Winfield Corp.,** Warren. Filed April 13, 1944. Issued Sept. 18, 1945.

A resistance-welding electrode holder comprising a tubular member having a means at one end to retain a welding electrode. A pair of spaced bushings in the member, located adjacent the other end, have fluid-tight connections with the side wall. A tube is anchored in the innermost bushing, extending longitudinally in the member to a point adjacent the electrode. The outermost bushing is sealed to prevent the leakage of coolant fluid therethrough, and fluid ports are disposed in the side wall on opposite sides of the innermost bushing.

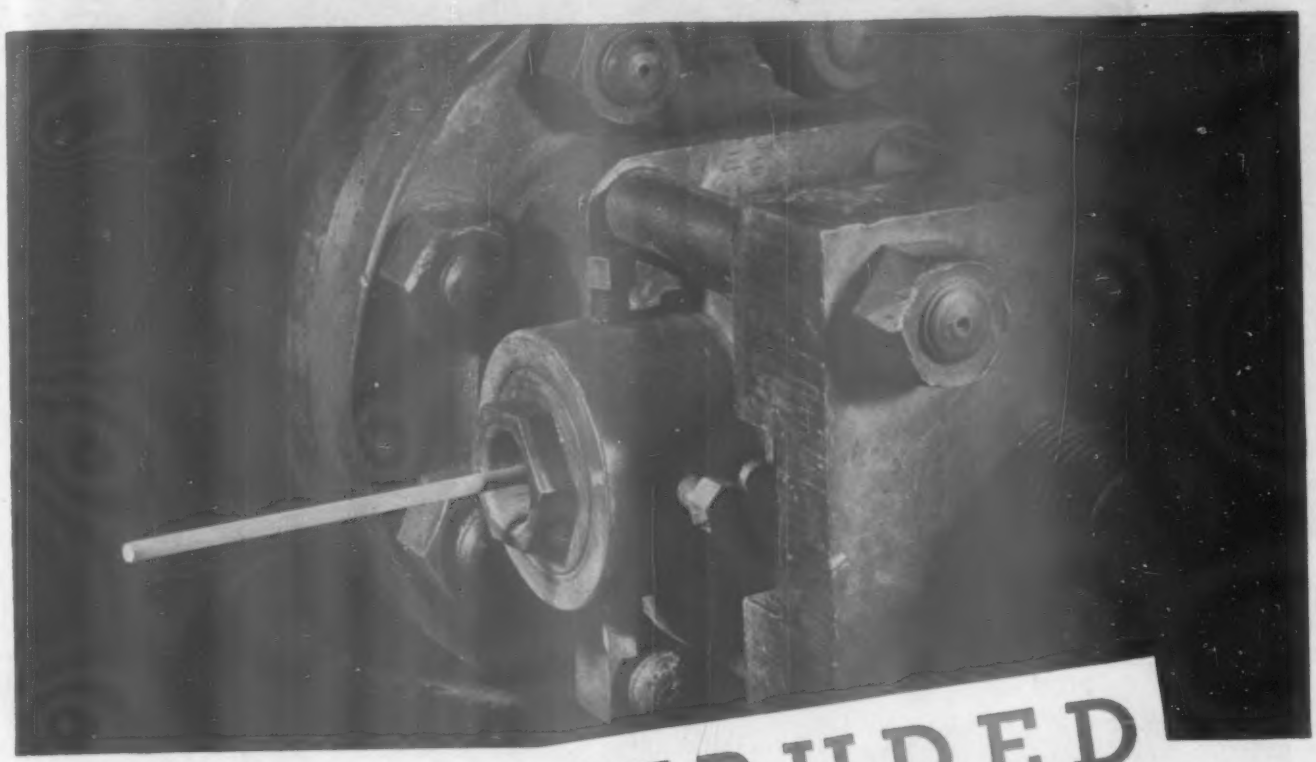
» «

Multiple Seam Welder

2,385,109. **Clifford S. Seltzer** and **Stanley M. Humphrey,** Warren, O., assigned to **The Taylor-Winfield Corp.,** Warren. Filed Oct. 11, 1941. Issued Sept. 18, 1945.

This seam welder has an electrically conductive horn, fixed to support the preformed blank to be welded and constituting one of the welding electrodes. A rotatable carrier supports a plurality of electrode wheels circumferentially disposed about the carrier's axis of rotation. The carrier is mounted for rotation about an axis extending at right angles to but spaced substantially outward from the principal axis of the horn. Each electrode wheel is adapted to traverse a portion of the blank supported on the horn.

SPEAKING OF QUALITY...



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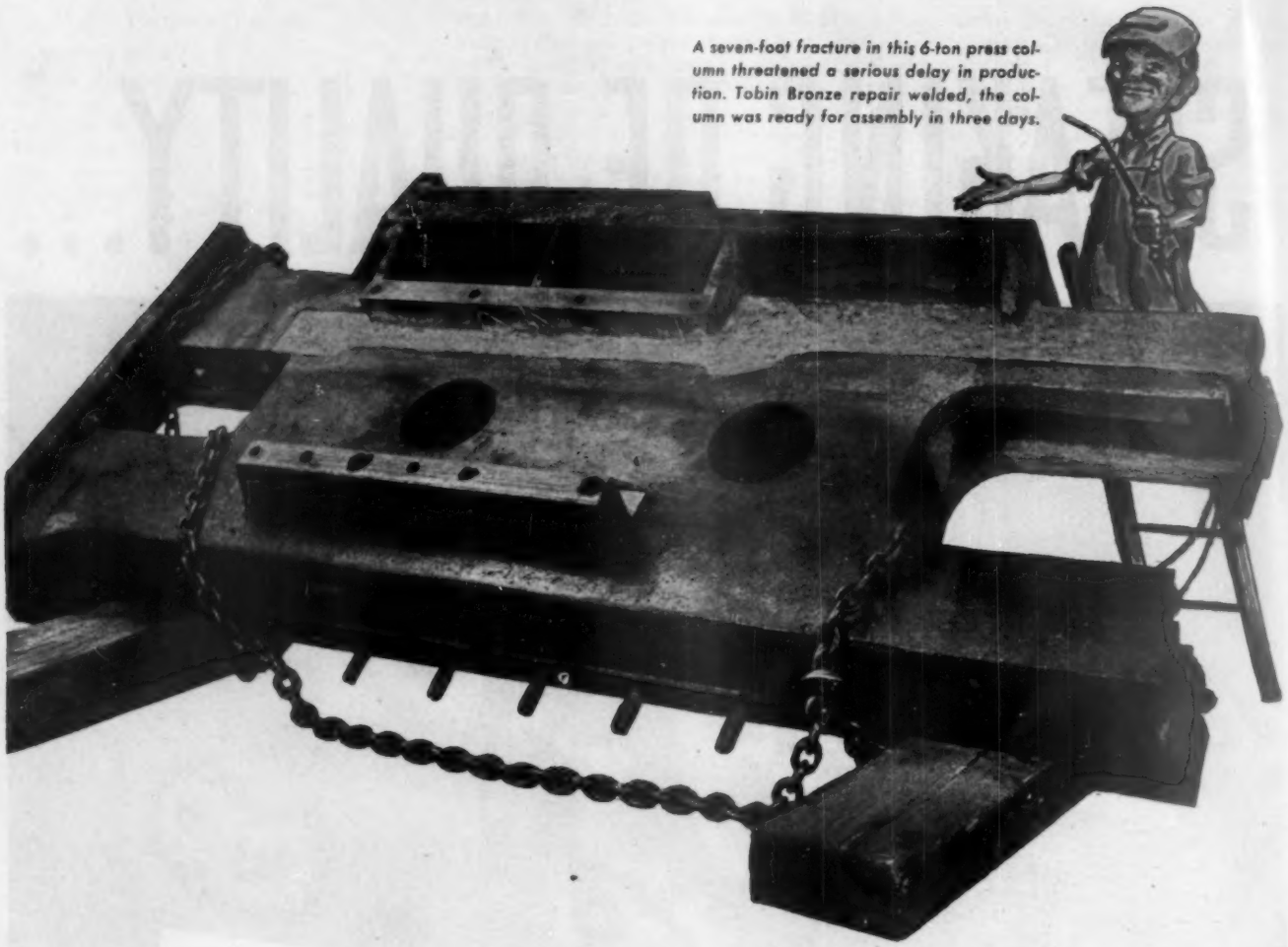

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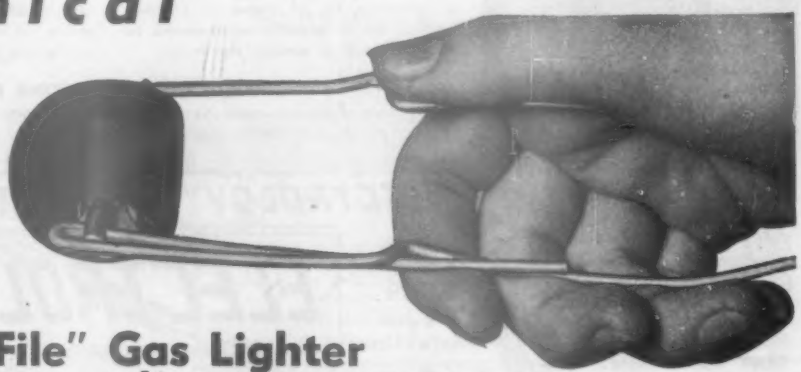

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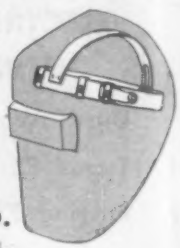

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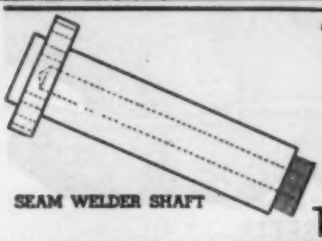

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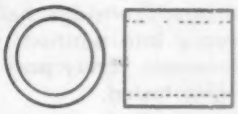

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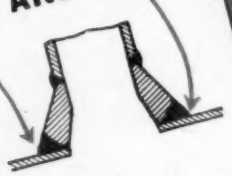

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